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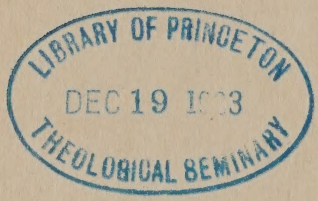

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A CENTURY OF PROGRESS SERIES

ADJUSTMENT AND MASTERY

PROBLEMS IN PSYCHOLOGY

By

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CHAPTER I

IS PROGRESS GOOD FOR US?

A CENTURY of progress! The name is certainly appropriate for the last hundred years, especially in the fields of science and invention. The more you learn of the recent progress of science, the more impressed and even thrilled you become; and the more you reflect on our modern improvements the more you are amazed at the distance we have come in this short span of a mere one hundred years. And the end is not in sight. Science and invention are advancing at a more rapid pace than ever, and so accustomed have we grown to this advance that we fully expect to see it continue. We are less attached to the old ways than we used to be and more willing to adopt new ways and new ideas. To call a person progressive nowadays is to praise him, and the same with a town, a nation, or a century; for progress has become one of our great ideals. How then can anyone venture to raise the question whether progress is good for us?

When I was a boy, nothing was more exciting to me than to become the proud possessor of a new

jackknife. My mother was not so well pleased; and as a matter of fact I always cut myself before I had the knife many days. The progressive nations seem to be cutting themselves with their new knives. The progress of science and invention, up to 1914–1918, enabled them to butcher each other with unprecedented thoroughness. With a little more progress and another world war, we could pretty well slash our civilization to bits. We have acquired through science such control over nature that we can produce more than we can buy, and consequently we have to stop working and grow poor. The automobile is a great convenience—to criminals especially. The radio and the movies are so far superior to home-made entertainments that they reduce most of us to the passive rôle of mere listeners and lookers-on. As a nation, as a world, we are careless and awkward with our new knives. We are childish with them and have not learned how to handle them safely and skillfully.

To speak more soberly: The progress of science and the applications of science in engineering, medicine and agriculture have put vast power into the hands of mankind. But it is becoming clear that we do not yet know how to use this power to advantage. Whether the progress of which we are so proud is heading for human happiness and prosperity is an open question. It almost looks

as though we are riding for a fall. Older civilizations reached their peak, declined, and passed away. Even though our own civilization has plenty of youthful vigor, there are some signs that we may civilize ourselves into a decline. History may repeat itself.

Who would be to blame? Some people are now putting the blame on the scientists. See what they have done to us. They have put high explosives into our hands, with the result that when we get into a fight we blow each other to pieces instead of merely pummelling each other with clubs. They have enabled one man to do the work of fifty and so are throwing more and more of us out of our jobs. At the same time they are prolonging our lives and producing a multitude of idle and poverty-stricken old people. They have taken industry and education out of the home and so reduced the family to comparative insignificance. They take away our old beliefs and leave us without any ready-made basis for morals.

Yet nothing could really be more absurd than this attempt to throw the blame upon science. Science has created a new environment for us, an environment in which more power and more satisfaction are available for mankind. Our difficulties arise from the ignorant and unscientific way in which we have tried to make use of our new

facilities. It is not because we know too much, but because we do not yet know enough, that we find ourselves in trouble. We need more science, not less, and what we especially need is a science of man himself. We need human engineering to balance our physical engineering. We need human science to serve as the basis for a truly scientific management of human affairs. The crying need of the times is for progress in the sciences of man, the psychological and social sciences.

If we knew the causes of war, we could probably manage to avoid war, and then our high explosives would not harm us. If we understood economics better, we could see a way out of the absurd situation of being poor because of our abundant facilities for creating wealth.

Physics and chemistry have made their discoveries by experimentation combined with mathematics and other ways of thinking clearly. Psychology has been conducting experiments for about a century now. At first thought it seems very difficult to conduct social experiments, and yet that is what our legislatures are doing all the time. They make experiments, but scarcely scientific experiments, because they never know where they start or where they come out. The Eighteenth Amendment was an experiment. If it had been

set up as a scientific experiment, the first step would have been to determine the state of affairs with regard to drinking, savings, poverty, crime, and all the other matters which it was hoped the Amendment would improve, so as to have a base line from which to measure the effects of the operation of the Amendment after five or ten years. No such provision was made for determining the results of the Amendment, and now it is too late: we shall never know. Such half-hearted experiments are always being tried and let go to waste for lack of scientific study.

We shall have to abandon the policy of drift in human affairs. Imagine such a policy in engineering—how far would it get in the development of the automobile or the radio? Such achievements are based on an enormous amount of scientific study. In our public and economic affairs we have not seen, most of us, that such study was necessary. We have taken it for granted that we should drift along, using our common sense and good intentions, and come out all right. Now that we face this new environment created for us by science, we are beginning to appreciate the need for something more than common sense and good intentions. Unless we can develop a real scientific grasp on human affairs, we are certainly

headed for increasing difficulties. But there are certain reasons why science progresses slowly in the sphere of human affairs.

For one thing, discovery and invention in this sphere bring less financial return to the interested parties. Evidently the automobile business or the radio business can well afford to put money into research. A psychological or social discovery might be of fully as much value to mankind, but who is going to invest money in the necessary research, in the hope of getting his money back?

Another obstacle to progress in the human sciences is man's bias and self-interest in all that pertains to his own affairs. We are determined *not* to see ourselves as others see us, or as we really are. But a science must seek the truth without bias. The scientist must be hard-headed and objective. Can a man be that way when he is studying himself? The psychologist avoids this difficulty by studying other individuals rather than himself. He finds it especially worth while to study the development of children and even the behavior of animals, for the light thus thrown on human behavior. The social scientist has greater difficulty in remaining detached and objective, since, even though he is not studying his individual self particularly, he is usually studying his own nation or his society, in which he has a stake and a per-

sonal interest. Sometimes, however, he studies other groups and so obtains practice in objectivity, so that this obstacle to scientific progress is by no means unsurmountable.

Human engineering has one more obstacle to overcome. Suppose we, the body politic, were in possession of the necessary scientific knowledge of human affairs, and that the human engineer could show us exactly how to improve our political and economic system, would we let him put his plan into effect? Not in this year of grace, but we shall come around to that attitude when the ideal of progress guided by science has spread to human affairs.

CHAPTER II

THE INDIVIDUAL AND HIS PROBLEMS

In the study of human affairs, the human individual is a center of interest and the scientific study of the individual's activities—the science of psychology—has an important part to play. It is one of the sciences which needs to be promoted and advanced. Psychology is sometimes classed as a branch of social science and sometimes as a branch of biology. In reality it is both. On the one hand, the individual is a living organism, a complicated system of organs and cells, and all the individual's thoughts, emotions and actions are biological activities. On the other hand, the individual's life from birth on is so closely bound up with the life of other individuals, and with the doings of such groups as the family and the community, that a very large share of the individual's activities have a social character.

If you are trying to understand the individual, you are interested in what the biologist has to tell about heredity, and in what the sociologist has to tell about tradition, for these two factors combine

to make the individual like his ancestors and predecessors. You are concerned with the make-up of the organism, especially with the active organs such as the muscles, and glands, the brain and the sense organs. You are also concerned to know about the environment which calls out and molds the individual's activity, and you soon find that an important part of the environment consists of the language, customs and institutions and in general of the "culture" of the social group.

The great problem before the individual is how to live and get along in his environment. To live, for a human being, means more than simply to stay alive; it means to have some of the fulness of life of which his human nature makes him capable and for which the environment furnishes the opportunity. The problem of living to the full in an environment that presents difficulties as well as opportunities is a serious one for all. Life means activity, and human life means complex and intense activity. A stone passively takes what comes and has no problems. A man must master his environment or else adjust himself to it.

What he does is partly the one and partly the other. He masters the environment as far as possible and for the rest adjusts himself to it. Or, he adjusts himself to the environment as far as possible and for the rest masters it. Some indi-

viduals are more masterful and others more adjustable or adaptable. To master the environment is to change it to suit yourself; to adjust yourself is to change yourself to fit the environment.

No one can get along with mastery alone or with adjustment alone. The two go together, as can be seen in the child's development. A psychologist made a study of a child's activity with building blocks from the age of eighteen months to that of five years. At first the child did no real building, but he handled the blocks, examined them, put them in his mouth, pounded with them, dropped them and pushed them around, and so acquired some mastery of this sort of object. A little later he would pile one block on another, or would lay them end to end on the floor, making a train which he pushed around to the accompaniment of tooting. Later still he built walls, enclosed spaces and roofed them over; and from that he advanced by degrees to the construction of quite elaborate buildings which he called houses, stations and steamboats. Thus he showed progressive mastery of his building material and at the same time better and better adjustment to its peculiarities. He learned what could be done with a certain kind of block and what could not be done with it, and governed his actions by this knowledge. To master a thing it is necessary to humor it, to

take account of its peculiarities and respect its limitations. Such adjustment is necessary whether the thing to be mastered is a set of building blocks, an automobile, an animal or a person.

Problems of mastery and of adjustment dovetail all through the individual's life. A baby at birth and again at weaning has to adjust himself to a new sort of food and at the same time master the means of getting the food. He finds himself in a world of objects that fall and have weight and he early acquires some adjustment to such objects and some mastery of them. He acquires a good deal of power in his family circle and at the same time has to learn that he cannot have every thing he wants just when he wants it. On the whole the child meets his problems more successfully than the older person meets his, the reason being in part that the child adjusts himself more readily. Still, we do find failures and maladjustments among children, though not such bad cases as we find in adults. The study of failures and maladjustments is one of the best ways of finding out the laws of mastery and adjustment.

We think of the school as a place where the child's job is to master certain subjects, but it is also a place where he has to adjust himself to many new conditions of life, to the school room with its rules, to the personality of the teacher,

and to the school mates. In the same way, when schooling is done and the youth gets a job, he has fresh problems of mastery and adjustment set before him. It is the same way with friendship, or with marriage: both parties acquire some mastery and also have to make some adjustments.

Individuals differ, as we shall take pains to show later on. They differ in part by heredity. But not all the differences between people—between children, for example—are due to differing heredity, for the early environment differs in a surprising way from one home to another and even from one child to another in the same home. Two homes may be on a par in material things, and yet be very different places for the young child. A large part of the early environment of the child consists of the parents. If the two parents act harmoniously together, that is one sort of an environment for the child to master and adjust to, but if the parents act at cross purposes, that is an entirely different problem for the child.

Parents do not always see the child as an individual with his own problems of mastery and adjustment, and they may thwart the child's progress rather than assist it; doing so even when they are very anxious to do their best for their child. A mother may love so much to have her child dependent on her as to give him slight chance

for learning how to dress himself, how to get along with other children, or how to master any part of his environment except the mother herself. A stern, repressive father, always finding fault and never praising, is demanding adjustment only, while a pampering one who spoils the child, yielding constantly to his demands, cheats the child of his opportunities for adjustment.

A slighted child has a different environment and a different problem of adjustment from that of the favored child in the same home. The younger of two brothers, outclassed at first just because of his brother's greater size and maturity, has a different problem on that account. Though society has long recognized that the child needs expert guidance in mastering the tools of all sorts, including the three R's, which he is supposed to master, it is only in recent years that his similar need for expert guidance in making his adjustments has been seen.

We have "child guidance clinics" or "behavior clinics," where parents or teachers can secure expert advice on "problem children"—advice based on careful study of the individual child and of his environment. There seem to be two main sorts of problem children. There is the disorderly, quarrelsome, domineering type, whose trouble may be that he has not adjusted himself, and there

is the shy, reserved type, whose adjustment consists mostly in withdrawal and who is often inwardly dissatisfied because he is not outwardly more masterful.

Some problem children come through successfully if the unprejudiced expert takes a hand, and if the home coöperates. Often the main difficulty lies in the parents, who are not experts and who are not unprejudiced, nor always rational in the way they handle their children.

The instances that have just been given of mastery and especially of adjustment rather give the impression that both are at bottom matters of emotion. The truth is rather that emotion may make it difficult for the individual to deal properly with his environment. Or, the right emotion can make it easy for him. It is easier to master something which interests you, and it is easy to adjust yourself to the peculiarities of some one whom you love. On the other hand, if you are deathly afraid of a certain person, it is hard to adjust yourself to him except by avoiding him altogether. Anger also makes adjustment difficult.

Fundamentally mastery is doing something. It is doing the right thing under the circumstances. It belongs on the active, motor side of life. To master a tool is to manipulate it so as to make it perform the work you have in mind. To master a

person may sometimes mean to give him a good beating and force him to obey you; or, at a higher level, to manage matters so that he will want to do what you desire. Strength, determination, skill, and tact are qualities that make for mastery.

On the other hand, adjustment is more submissive and at first appears passive rather than active. Examined psychologically, however, it proves to be a form of activity. It is not passive, though it is receptive. It is based on understanding and appreciation. It belongs more on the sensory or receptive side of life than on the motor side. To adjust yourself to a person is to see him as he is and accept him for what he is. To adjust yourself to a situation is to sense the situation and be ready to act accordingly. Just as there are very simple and rudimentary forms of mastery, so there are of adjustment. Attending to an object is a preliminary adjustment to it, observing it carefully carries the adjustment further, and knowing what it is and what it signifies goes a step further in the same direction. Adjustment is necessary for mastery, for without some appreciation of the object you have to deal with, you are in no position to take hold and manage it.

It is not our intention to explain all human activity in terms of mastery and adjustment. These are not explanatory terms for the psychologist.

They are classes of problems which the individual has to meet. The psychologist's effort is to get beyond and beneath these terms, and see how mastery and adjustment are achieved.

CHAPTER III

SOME EXPERIMENTS ON MASTERY

PSYCHOLOGY has been studying the elements of mastery for about eighty years by the experimental method. The first experiments were on very simple performances and consisted in measuring the "simple reaction time," which is the same as the starting time in the hundred yards dash. Let an individual be all ready to make a certain movement as soon as he receives a certain signal or "stimulus": still he cannot begin to move instantaneously; a little time is required by the nerves to transmit the impulse from the sense organ that receives the stimulus to the brain and thence to the muscles that make the movement. If an untrained "subject" in the laboratory has his finger ready to press a telegraph key on hearing a certain sound, it may take him half a second to start his finger movement after the sound reaches his ears. That is on the very first trial; his time will come down to 0.3 second and to 0.2 second in the course of a few trials, and with further practice to about 0.15 or 0.12 second or even to 0.10 if he is very quick

indeed. A tenth of a second is about as absolute a limit for the simple reaction time as 10 seconds or a little less is for the hundred yards dash.

Even after long training in this special performance a person's reaction time is not perfectly uniform. It varies from trial to trial, though between narrow limits. Moreover the reaction can be speeded up by special incentives. With apparatus arranged to give the subject's finger an electric shock unless he moves very quickly, the reaction time of a highly trained subject has been cut down from 0.14 second to 0.12.

Thus this simple experiment (which indeed requires very accurate apparatus) teaches several important facts about skill and performance. It shows the limits of motor speed. It reveals the all-pervasive fact of human variability, including the variation of the single individual's performance and the difference from one individual to another. It shows the importance of readiness or "set," since the reaction is much slower unless the subject, like the runner at the starting line, is all ready and set for making a specified response to a specified stimulus. It shows the effect of incentives. And it shows, even in so simple a performance, the improvement that comes with practice. It recalls the old maxim, "Practice makes perfect," which maxim, however, we shall find reason for qualifying very materially.

The early experimenters went on to more complex reactions, and found that the greater the demand made on the subject, the slower his reaction. If the subject is shown a letter and names it as promptly as possible, the reaction time is about 0.4 second; but it takes no longer to name (read aloud) a short familiar word than to name a single letter. This result shows that a word is read directly and as a whole, and not by spelling it out.

EXPERIMENTS ON LEARNING

The next important step in the study of mastery was to examine the learning process. Of the hundreds of experiments on learning that have been made in the past fifty years, the earliest dealt with the memorizing of verbal material such as poems, number lists, and lists of nonsense syllables ("rom, zeb, wac," etc.). Then came studies of the acquisition of skill in telegraphy and in typewriting. About that time the animal—chick, cat, rat, monkey—was introduced into the psychological laboratory for learning experiments, with the sound idea that the animal's process of learning would be less elaborate and easier to follow than that of man. Much has been discovered also from studies of learning by children. We will look at a few typical experiments.

First, an experiment on memorizing, which the reader can try for himself. Below are two lists of words, and the task is to master a list so as to recite all the words in the given order.

1	2
wool	journey
sedan	railroad
pause	balloon
news	passenger
table	workshop
vacation	hammer
street	machine
mermaid	motor
whistle	woman
cotton	nephew
dinner	servant
window	stranger
castle	progress
lemon	century
storm	science
ribbon	exhibit

If you find in such a list any sequences that make sense, your task is made easy. (The second list is easier than the first in this respect.) In general the process of memorizing a list is that first you get some impression of the list as a whole (what it is made up of, about how long it is, etc.); then you pick it to pieces, notice the separate words, connect them with each other and with their positions in the list or in some way group and interrelate them; finally the groups have to be connected into

a total organized whole. A series of *related* words falls into organized patterns readily and so is easily learned.

Learning to read. In the old days, the beginner was first taught to name the letters, then to spell and pronounce the simplest combinations of letters and the shortest words, after which he was allowed to try short phrases. The fact that an adult reads a short familiar word as quickly as a single letter suggested that the child would be able to recognize words without first learning the letters, and today reading usually begins with words and phrases, and the letters are learned later. The child can learn either way, but it is more in line with the general process of learning to start with a whole and later to master its details.

Learning to typewrite. Here it is almost inevitable that the letters should be mastered at the outset. You can *see* the pattern of a whole word, such as

ψυχολογία,

without knowing the letters, but you cannot type a word without striking a separate key for each letter. Therefore learning to typewrite proceeds from part to whole rather than in the more usual way. Whether he types by the "sight method" or by the more efficient "touch method," the gen-

eral line of the learner's progress is about the same. First he builds up "letter habits" and later "word habits" and "phrase habits."

A young man with no previous typewriting experience practiced about an hour a day for 170 days, his speed being recorded every day. His

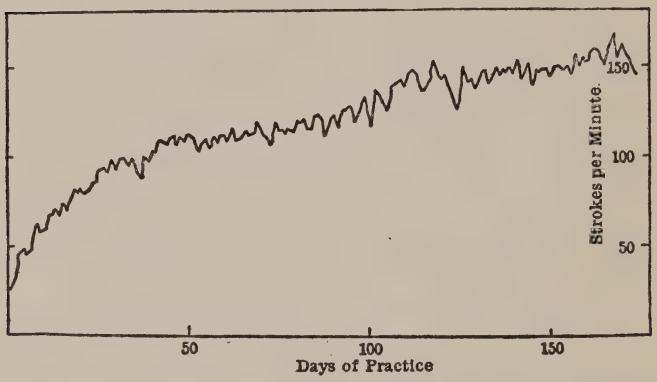

FIG. 1. Progress of one of W. T. Book's subjects in mastering the typewriter. On the first day the student made about 25 strokes per minute, while after 150 days he was writing about 150 strokes per minute and still improving a little. Figure copied from Woodworth's *Psychology*, 1929. By permission of Henry Holt & Co.

gain in speed is shown here in the form of a "practice curve." The jagged form of the "curve" shows the fluctuations from day to day, and the general upward trend, flattening out at the high level, pictures the progress towards mastery. (See Fig. 1.)

How was this improvement achieved? At first the student, who was allowed to see the keyboard as he wrote, followed the "Hunt and Peck" method. He spelled out each word, located each letter in turn, struck the key, and so proceeded letter by letter. After a few hours of practice he knew the keyboard thoroughly and could strike any letter without hunting for it. His writing at this stage consisted in a series of separate responses to the separate letters. He supposed, naturally enough, that he had now mastered the essentials of typewriting and that all he had left to do was to speed up his letter movements.

As a matter of fact, the learner was not writing at all in the expert way—not as yet. All his spelling out of the words and attentive locating and striking of separate letters could be dispensed with if he only knew how. But how else could he write?

Take the word *better* for example. The *t* has to be struck twice in succession, and if you notice that fact in time you can make a rapid double stroke on *t* instead of striking it once and then making a fresh start and striking it again. The *e* occurs just before and again just after the double *t*; if you notice that fact in time you can keep your finger ready to strike *e* a second time as soon as the double *t* is out of the way. Thus by looking ahead in your writing you organize the single

movements into patterns. By looking ahead you prepare for making a series of letters; and if this is a frequently occurring series you get the habit of the series. Thus you build up patterns of finger movement for the common words, master these patterns by frequent use, and no longer have to spell out the words, since you can throw the pattern for the entire word into action. With continued practice you build up motor patterns for all the common words and for the commonest short phrases as well, so that most of your writing is done by patterns rather than by the slow, jerky process of responding to separate letters.

How the rat learns a maze. The white rat is a tame but lively creature, bred and reared in laboratories and much used by psychologists for experiments on learning. His formal education consists largely in learning to run mazes. He is taken while hungry and placed in the entrance chamber, the door into the maze is opened and he rambles out into the first alley and starts exploring in an easygoing way. A bit of food has been placed in some distant part of the maze, without his knowledge. In his leisurely exploration he enters the various blind alleys, goes back and forth along the passages, and finally, after perhaps five minutes, comes to the food box and grabs the morsel of food. The experimenter now replaces him in the entrance

chamber. His behavior immediately changes. He shows haste to get into the maze again and darts about it, entering the blind alleys but quickly coming out of them. It is more or less of an accident whether he reaches the food box soon or late this second trial, but in the course of a dozen trials, distributed over several days, he eliminates the blind alleys and, running full speed, takes only 15 seconds to go from the entrance to the food box. The rat has mastered the maze, but the question is how he has done it.

One theory has been that he learns the proper turns separately, and later by degrees gets them strung into a series, so acquiring a "chain reflex" or series of movements each of which simply calls out the next in order. This chain reflex theory may contain some truth but it does not account for the following fact: The rat learns easily to keep out of blind alleys that lead in a direction away from the food box, but has difficulty with those that seem to lead towards the food box. Evidently one of the first things the rat learns in a maze is the general direction of the food box. He gets his bearings before he masters all the twists and turns of the maze. We can say, then, that he masters the whole maze in a vague way before he masters the details. The broad framework of the performance is acquired early and the details

filled in later—a process which is typical of human learning as well.

INSTANTANEOUS LEARNING

From the examples so far it might appear that learning is always a matter of repeated trials and gradual mastery. But there are some examples of quick learning and of sudden transition from helplessness to mastery.

Instead of learning a long list of words, if you try a series of only four, such as

president cable theater valley,

you can probably recite it after the first reading. It is short enough to fall within your "memory span." A telephone number falls within your memory span; you read it once from the book and can then use it. However you will not *retain* it long unless you use it repeatedly.

Again, we should notice that the maze which the rat learns only in many trials has many blind alleys. A very simple maze, with only one place where a choice of paths is offered, can sometimes be mastered in a single trial.

Chimpanzees, it has been found, sometimes learn a trick suddenly, passing abruptly from helplessness to mastery as if by a flash of "insight"; and the same result has been obtained with young

children. In one experiment a boy just turned three years old was placed in a nursery play pen, with an attractive toy lying on the floor outside and nothing but a stick inside. He was told to get the toy but nothing was said about the stick. The little boy tried to reach the toy by stretching first one hand and then the other between the bars of the pen, saying after each attempt "I can't." He tried to find a door, tried to climb out, reached with his foot and again with his hand. At one time he looked toward the stick without seeming to notice it, but after three minutes of fruitless effort he again looked toward the stick, pounced upon it and carefully fished the toy in with the stick. A few days later the test was repeated, with a little broom substituted for the stick. The boy at once grasped the broom and fished in the toy, and then proceeded to repeat the performance several times just for the fun of it.

Here the possibility of using the stick to reach the toy dawned suddenly on the child and the essentials of the trick were mastered then and there. The performance to be mastered was a more compact unit than the running of a maze; its pattern was simply stick-reaching-for-distant-toy. Repetition was not necessary to fix the pattern, once it had been grasped, though repetition would undoubtedly give greater facility of manipu-

lation and make it more certain that the child would retain the trick for a long time.

The experiments agree in pointing to the important rôle of pattern-forming in acquiring skill and mastery. As to the rôle of repetition they leave us in some doubt, which we will try to clear up in the next chapter along with other crucial questions in the psychology of mastery.

CHAPTER IV

THE PSYCHOLOGY OF MASTERY

WHEN we say that "practice makes perfect," we commonly have in mind long continued practice with many repetitions of the performance to be mastered. Some of the results in the last chapter rather indicated that the essential step in mastering a performance might be taken in one trial, at one particular moment, and that the rôle of repetition might be secondary. If we learn by doing, it may be less important to do it often than to do it right.

Quite a large number of psychologists, approaching the problem of learning from very different angles, have recently spoken out against the old doctrine that we learn by repetition, and against the somewhat similar doctrine that what we have learned is more and more firmly fixed by continued repetition. Some have gone so far as to maintain that repetition of an act tends to unsettle that act and to eliminate it. They have in mind such results as the following. Rats which had learned a maze quite thoroughly, being rewarded for each successful run by a few laps of cream in the food

box, were divided into two groups, one of which continued to run the maze with the same reward, while the other group ran with no reward. The rewarded animals kept up their almost perfect performance, with practically no errors and about 25 seconds per run. The unrewarded animals, on the contrary, began to slow down and wander into the blind alleys till finally they were making 8 errors per run and taking 130 seconds for it. The conclusion is that repetition with reward helps to establish a performance and to maintain it when established, while the same repetition without reward weakens and eliminates the performance.

The truth may be that repetition by itself neither strengthens nor weakens a performance but simply affords a chance for reward (or success) to establish the performance and for punishment (or failure) to eliminate it. One of our leading psychologists suggests that the best way to eliminate an undesirable habit is to repeat it over and over again in cold blood, always mentally punishing oneself for doing it. He himself had the habit of writing "hte" for "the" on the typewriter, but by writing page after page of "hte," always saying to himself that this was a bad mistake, he succeeded in eliminating the error. He has had some success with stutterers by training them to stutter in cold blood. Enuresis might be treated in the

same way. The method is still too little tried to be recommended for general use, but the idea opens up new vistas in the psychology of learning and unlearning.

REWARD AND PUNISHMENT

Let us use *reward* in a broad enough sense to cover any result of an act that is satisfactory to the doer, and *punishment* in a similarly broad sense. Any successful performance carries its own reward and any unsuccessful act its own punishment. If a rat in his search for the food box enters a blind alley and has to turn back, that is punishment. If a beginner in typewriting writes a word quickly and correctly, that success is his reward.

With this broad use of terms understood, we ask whether the improvement that comes from practice is due to the constant repetition of an act or to reward and punishment. The theory that *mere* repetition accounts for the improvement has pretty well broken down. Exactly *how* reward and punishment react upon the organism to establish one performance and eliminate another is a difficult problem in physiological psychology; but the fact that they do so is scarcely open to doubt. There are however some apparent exceptions to be explained.

Many bad habits of children, such as temper

tantrums and food fads, seem at first thought to persist without reward and in spite of punishment. What satisfaction can the child derive from half starving himself, from weeping and bawling, or from waking up to find he has wet the bed? These habits carry their own punishment and in all logic should be self-eradicating. When the cases are studied in a child guidance clinic, however, a reward is often unearthed. The child's strange habit worries the parents who fuss over him and make him the center of the stage and so give him the social recognition which is one of the choicest rewards of human beings. In such cases the cure consists in inducing the parents to reserve their social rewards for worthwhile behavior; and the child himself may be brought to see that he is getting into all this trouble in order to win attention, and that he could win attention in some better way.

But why do perfectly needless fears persist unless by inertia and repetition? A well-known experiment showed how such fears can originate. A young child who had no fear of a white rat but tried to get hold of it was punished each time he reached for it by the sudden sounding of a loud noise close to his ears. After a few repetitions of this procedure he shrank from the animal whenever it was placed near him, and this fear persisted

for a long time. Many such needless fears are picked up by the child from the warnings or frightened behavior of adults. What keeps these fears alive? If the child should some time neglect to shrink or run away he would get no harm, and when he does shrink or run away he escapes no harm and so, it would seem, has no reward. Perhaps he does have a reward—he *thinks* he has escaped some harm. He may come breathless into the house and say, "Oh, mother! There was a dreadful cow in the street and it looked at me, but I ran as fast as I could and got away." This imaginary reward is as effective as a real cookie.

But surely, it will be said, there are many habitual acts that have become so automatic as to be performed without either pleasure or annoyance. They seem to be kept in good working order with no trace of reward or punishment. Mere repetition must be enough to keep a well learned act in good working order. Such is the superficial appearance, but the real fact may be otherwise. Take for example the use of your familiar key in opening a door. You had a little trouble with that key at first, and during the process of acquiring mastery you were rewarded and punished, for when the key worked well you were pleased and when it balked it annoyed you. If you notice what happens today when you use that

familiar key you may find slight pleasure or annoyance still present; and if so there is still a check on the skill of your performance, and no mere repetition. Signing your name ought to be purely automatic, it would seem; yet you may detect a certain pleasure in doing it in your characteristic manner and with your own private flourish. The frequency of profanity and of milder expressions of disgust, in golf and other performances, shows that we are always taking punishment both in work and in play.

It is hard to find any clear case of repetition absolutely free from reward and punishment, and therefore it is hard to find out what the effect of mere repetition would be. Yet we can safely assert that repetition is an important practical factor in learning. It is necessary for learning a complex performance. An act has to be done in order to be rewarded or punished; and a complex act has to be done many times before all its details are right and well fitted into the total pattern.

MASTERY LIMITED BY OUR STANDARDS

Whether a given performance shall seem to the performer a success or a failure depends on his standards. A beginner at typewriting would be immensely pleased at a speed of work which would be humiliating to an expert. In a dart-throwing

experiment, two targets were set up at the same distance but one twice as large as the other. The accuracy of throwing was distinctly better with the smaller target. The smaller target set a higher standard because an error of so and so many inches looked worse on the small than on the large target.

Most of us do not attain the degree of mastery of which we are capable. Our standards are set by what is customary among our fellows and are moderate rather than high standards. Even with the best will and effort we should not necessarily hit upon the best technique. In industrial processes, "motion studies" have revealed a vast amount of superfluous movement and unnecessary fatigue. Scientific analysis of any man's work would probably indicate ways in which he could improve the quantity and quality of his output and at the same time work more comfortably. So there are several reasons why practice alone does not make perfect.

ESSENTIALS OF LEARNING

Some psychologists have insisted on the importance of repetition in learning, some on the importance of reward and punishment (broadly defined) and some on the importance of "insight" or getting the pattern of situation and performance. As a matter of fact all three factors are required.

The great turning point in learning a performance is the moment when it is done the *first time.* Until it has been done once it cannot be repeated, and until it is done it cannot be rewarded. The first essential is to get it done once.

The big moment in the child's learning to use the stick to reach the toy was the moment when it dawned on him that this could be done. At that moment he got the pattern. Shall we say that this getting the pattern was the whole story of mastering the situation? No, for he had got other patterns before, more obvious patterns like reaching with his foot. Only these obvious patterns failed to work; they brought punishment (failure) and were discarded. The reaching-with-stick pattern worked, was rewarded and used again. Thus reward and punishment came in as a selective factor. And how about repetition? We notice that the child used the stick the second time more skilfully than the first and we cannot doubt that further repetition would have made him still more expert.

What we know about the process of learning boils down to this. The learner at the outset is confronted by a problem-situation. He wants to get something but has no ready way of reaching it. The situation is, for him, a vague, unorganized total. He proceeds to pick it to pieces somewhat,

to find parts, relationships and patterns—something to work with. He tries out his patterns and is punished by failure and rewarded by success. What he thus learns is retained to some extent and utilized in later trials. With repetition his standard of success is apt to rise, so that reward and punishment operate on a higher level. His performance-pattern becomes more perfect in its details, and thus repetition leads to quicker, smoother, easier and more accurate work, and to greater confidence.

EMOTIONAL FACTORS IN MASTERY

Something will be said of the emotions later on, but one or two points should be brought out here in connection with learning. The beginner at any new task is likely to feel awkward and unsure of himself. If his task is that of memorizing long lists of words he will say that it is impossible for him. With the experimenter's encouragement he has a try and finds that he succeeds after a number of repetitions. When he tackles the next list he has more confidence and succeeds better. Evidently a person cannot give himself up wholly to his task if he is distracted by self-consciousness and worry. Of course one person may be hampered by over-confidence as another is by under-confidence, but the latter seems to be more common.

After being disabled by sickness or injury one has the problem of getting back on one's feet—a problem of mastery. Some people try to rush matters too fast, but others feel insecure and are not willing to take any chances. A disabled soldier in a reconstruction hospital had progressed to the point where he could walk by holding on to the wall or chairs, but it was a long, long time before he dared to do anything more radical. One morning, when feeling fine, he took a chance and walked straight across the floor; and this was a "big moment" in his recovery.

When the situation to be mastered includes *people*, emotional and personal qualities play a large part. "Mastering people" has perhaps a hard and cruel sound, but leadership, influence and tactful management are all to be placed under the general head of mastery. Self-confidence is an asset here even more than in mastering an automobile or an airplane. The leaders of men show self-confidence, but they also show an interest in other people and an understanding of them. To see the qualities of leadership we need to study the great leaders, not so much after they have won such prestige that their followers jump to do their bidding, but more especially in their early days when they were winning their way to leadership. Then we see how closely they study the people they

have to deal with, and how they often take pains to inform themselves beforehand about a person so as to meet him on his own ground. In short they adapt themselves to the people whom they desire to manage or influence. Mastery demands adaptability; it demands adjustment. It does so even when a thing rather than a person has to be mastered. To manage an automobile, you have to "meet it on its own ground." So the problem of adjustment, to which we turn next, is closely tied up with the problem of mastery.

CHAPTER V

SOME SIMPLE CASES OF ADJUSTMENT

In mastering a thing you act upon it, while in adjusting yourself to a thing you let it act on you. You are really active in both cases, but in adjustment your activity is of a receptive sort. Listening to a person talk is a case of adjustment, especially if you listen carefully; for even if you do not agree with him or obey him, at least his words make some impression on you. You get his meaning and register what he tells you as a photographic plate registers light or as a thermometer registers heat.

The organism is a registering instrument as well as a doer of deeds; it is sensory as well as motor, with sense organs as well as muscles. The sense organs receive stimuli from the environment and enable the organism to register the facts of the environment and to adjust itself to them. Evidently the first step in adjusting oneself to certain facts is to get the facts, and this getting the facts is itself a sort of adjustment. If you are hiking across country and come to a river, seeing this obstacle is the first step in adjusting yourself to the situation and in mastering it.

Instead of calling a man a registering instrument, it might seem better to say that he has several registering instruments, the eye, the ear, and the other senses. But no sense organ acts all by itself; each is connected by its nerve with the brain, and it is the brain rather than the eye that sees. It is really the whole organism, the whole man, that sees or hears or smells.

Man is a peculiar instrument in that he registers so many different sorts of facts. He is a thermometer for heat and cold, a camera for light, a phonograph for sound, scales for weight, and a delicate chemical indicator for certain substances that have taste or odor.

Let us see what we mean by calling the human organism a thermometer. We mean that by using the skin as a detector you can tell whether an object is warm or cold. By practice in guessing the temperature of the air every morning, you can estimate it within two or three degrees, though with occasional large errors. The skin can detect a sudden change of a fraction of a degree under favorable conditions, as when you hold your hand for a minute in water of a certain temperature and then transfer it to water slightly warmer or cooler.

The skin quickly adjusts itself, within limits, to warmth or cold. Warm water ceases to feel warm, and cool water to feel cool, after a few minutes immersion of the hand. In a different

way, the whole body adjusts itself to temperature. Exposed to a high temperature, a man flushes and sweats and so keeps his internal temperature from rising much above normal. When he is exposed to cold, the blood is driven from his skin, perspiration ceases, shivering sets in, and there is a tendency to use the muscles and so prevent the body temperature from falling. The whole mechanism for maintaining a constant body temperature in spite of environmental changes includes the temperature sense as a detector, the nervous system as a regulator, the muscles as a furnace to produce internal heat, and the sweat glands and blood vessels of the skin as windows to open and shut in order to release more or less of the internal heat.

We have here a good example of what is meant by adjustment. The organism has certain major needs or requirements, here the maintenance of a steady body temperature. When the environment presents difficulties, this requirement is not given up, but some internal adjustment is made that will meet the requirement. Adjustment is not a mere yielding to the environment; for example a warmblooded organism like man does not allow his internal temperature to rise and fall with the weather. Adjustment maintains the major requirements of the organism in the face of environmental difficulties. It does so however at the

expense of sweating, shivering or some other activity that is undesirable in itself and that is done only when necessary. We might speak of the organism as yielding on minor points in order to maintain its major requirements.

Adjustment, while not a passive yielding to the environment, does nevertheless take account of the environment. The organism registers the environment. If we go a little further in the study of man as a registering instrument, we shall glimpse some of the fundamentals of adjustment, and at the same time we shall be reviewing some of the major achievements of the science of psychology during these hundred years.

REGISTERING PHYSICAL STIMULI

The early experimenters studied the senses as receivers of physical stimuli and tried to discover the elementary stimuli affecting each sense and the elementary responses of each sense, the elementary sensations. Take the sense of taste for example. What things do we taste and what different tastes do we know? Naïvely we say that we know the taste of bread, meat, orange, onion, coffee and a hundred other substances. But the simple experiment of holding the nose while taking a substance into the mouth shows that most of these so-called tastes disappear when the sense of

smell is thus cut out. The distinct tastes are only four in number: sweet, sour, bitter and salt. In eating, with the nose open, we get these true tastes combined with the odors.

Suppose, again, that we were asked what we see. We should probably answer, "All kinds of objects." If we were asked how the eye enabled us to see a distant object, and if we knew no physics at all, we might surmise that the eye had some subtle way of reaching out and grasping the object, or that the object had some way of sending images of itself to the eye. But physics assures us that all that happens is that light from the object strikes the eye—light from every part of the object, some of it more intense and some weaker, some of it of one "wave length" and some of another. Experiments on the sense of sight show that we see different colors according to the wave length of the light, and that we see different brightnesses according to the intensity of the light. What we see, then, is light in patches of different brightness and color. The optical system of the eye separates the light coming from different directions and so gives us a mosaic of variegated patches, and this mosaic is what we see. What we see is about the same as the painter puts on his canvas. All he can put there is patches of color in a certain arrangement.

In the same way, all that reaches the ear is sound vibrations of differing intensity and wave length. The ear has no system of lenses for spreading sounds out into a mosaic, but it does have a system of wave analyzers which prevents the vibrations from being heard as a mere blur. We can hear two separate sounds at the same time, and distinguish chords and discords as we could not without this analyzing power of the ear.

Carrying this sort of scientific investigation around the list of senses, we come out with man as a registering instrument for light and colors; for tones, high and low, loud and soft, plain and mixed; for the four tastes and about six elementary smells, and for warmth and cold, pressure and pain. Is this a satisfactory description of man as a registering instrument?

It is not very satisfactory to naïve common sense. We commonly think we taste peppermint, smell a turkey roasting, see a tree, hear a person talking or feel a hard, smooth, cold, heavy ball of iron. We seem to see that the weather is fine and hear that the motor is missing. For practical purposes it is certainly true that man registers facts and objects of the environment rather than the physical stimuli which strike upon his sense organs.

REGISTERING THE ENVIRONMENT

What is true for practical purposes or for naïve common sense is significant for psychology. The facts that a man actually registers when his senses are stimulated are fully as real and important, psychologically, as the elementary physical stimuli that his senses receive. If man notices objects and adjusts himself to them, the question is how he does this, when all he directly receives from the environment consists not of objects but of lights and sounds of various intensities and wave lengths, pressures on the skin or muscles, heat of different intensities, and certain chemical stimuli. Here we have a major problem of psychology.

The older answer was to say simply that the child *learned* to use the data supplied by the senses as indicators of the objective facts. But though learning undoubtedly has a great deal to do with it, we begin to see clearly that the organism is built for adjustment to the objects of the environment. In other words it is built for practical life. It is easier to notice the total "taste" of an orange than to notice the sweet, the sour and the odor which are the sense data in eating the orange. It is easier, no doubt, for the baby to notice some object moving than to notice the play of light and color that his eyes directly give him. Certainly

it is easier for an older person to see how far away an object is from him than to tell how he knows its distance or point out the data on which his knowledge of the distance is based. It took the painters of the world many centuries to find out how to show the distances of objects on canvas —how to use perspective, shadows, coloring and other indicators so as to make distance and the molding of objects appear convincingly to the eye. But the child learns easily to use these same indicators in his seeing of the objects around him.

The movement of an object is a fact of practical importance, and a fact which we see very readily. We see not only that there is some movement but what kind of movement it is. How is movement seen? The old answer was that the eye gave us the object in a series of positions which we then strung together into a movement. But if you take snap shots of a horse trotting or of a man doing the high jump or gesturing, many of the views have a very queer look. It seems impossible that you ever saw a horse or a man in those awkward positions. Fact is, you do not usually see those positions, just because what you see is the continuous motion. The motion passes through the positions revealed by the camera, but what you see is the motion as a whole, as a "pattern."

There are great differences between the picture that is before your eye and the environment as it is and as you see it to be. What you see and register is a close approximation to the environmental facts, departing widely from the data of the picture. The sizes of the real objects do not correspond to the sizes of their images in the picture, nor do the colors correspond.

Take first the matter of size. If a man who is standing ten feet from you moves away to a distance of twenty feet, his height in the eye's picture diminishes to half of what it was, and if he moves away to fifty feet it diminishes to one-fifth. This is a pure matter of geometry, which you can verify by using a device of the painters for measuring the picture size of an object: Take a pencil in your fist, hold it at arm's length, and mark off on it with your thumb so much space as is necessary to cover the object. If you first make an unaided estimate of the picture size of an object across the room, you will probably find your estimate pretty poor, and much poorer than your estimate of the real size of the same object. If two men are standing at different distances from you, you can instantly see which is really the taller; but their picture sizes are hard to compare. The picture size depends on two objective facts, the real size and the distance of the object; and you get these objective

facts much better than you do the picture size which the eye directly gives you. Of course the picture size is of no practical consequence unless you happen to be making a picture yourself. Otherwise you are fully satisfied to break up picture size into its two objective factors, object size and distance.

It is the same with the colors of objects. The eye gives you a picture of a scene in which each object has its "picture color," but what you get is the "real color" of the object plus the illumination the object is receiving. Suppose as a novice in painting you undertook to paint a girl in a white dress standing in the shade of a tree. For the white dress you would probably use white paint, but then you would find the effect all wrong, the dress much too glaringly bright for anything standing in a shadow. You would have to paint that dress a fairly dark gray in order to reproduce the picture which your eye gives you. The artist trains himself to see picture colors as they are, but the rest of us break up each picture color into the two objective facts, real color and illumination, just as we break up picture size into real size and distance. In both cases we evidently take account of the whole situation in registering the particular facts.

Other striking examples could be brought for-

ward to illustrate the general principle that man, as a registering instrument, registers objective facts, facts of the environment, rather than the physical stimuli reaching his sense organs. It is the objective facts that have practical importance for the individual's life; he has to adjust himself to objective facts. The stimuli his sense organs receive are of no consequence, usually, except as indicators of external facts. (We should make an exception of pains, which are indicators of internal rather than of environmental facts.) He has to deal with objects, persons, conditions. His motor activity consists in managing objects rather than merely in the contraction of his muscles—and his sensory activity consists in perceiving objects rather than merely in receiving stimuli. The muscles correspond on the motor side to the sense organs on the sensory side. All man's information from the environment comes by way of his sense organs, and all the results he accomplishes in the environment are executed by use of his muscles. But the muscles and sense organs are simply intermediaries through which the brain deals with objects. On the sensory side, the brain registers objects and facts about them; on the motor side it manages objects. The brain is like a general secluded in his tent during a battle, but having excellent means of communication; what happens

out in the field is registered in his tent and he maintains control over the actions of his army. What he is dealing with is the field rather than the messages that pass in and out, though his only contact with the field is through these messages.

LEARNED ADJUSTMENTS

We alluded a few pages back to the old theory that the child started life with only the raw data of the senses and that he learned the objective meanings of these data by dint of experience. He probably does have to learn all the specific meanings, but the objective tendency is with him from the start. That is, from the start he reaches out into the environment to see what is there and is not satisfied with mere sensations and pictures. He is built to register objects rather than simply to register stimuli, just as he is built to manipulate objects rather than simply to exercise his muscles. His objective tendency gives him a successful line of attack upon the world, but to know the world in any detail he has to learn through experience.

One of the simplest forms of learned adjustment is seen in the celebrated *conditioned reflex* experiment. The experiment was first performed on dogs, by the Russian physiologist, Pavlov. As everyone knows, saliva flows when food is taken into the mouth, and this is as true of dogs as of men.

It is a natural or "unconditioned" reflex. Pavlov noticed that the dog's saliva was apt to start flowing before the food was actually in his mouth. It would start when the dog smelled the food, when he saw the customary dish in which food was brought him, or even when he heard the footsteps of the keeper who used to bring him his food. The smell, the appearance of the dish, and the footsteps had become signals of approaching food. Pavlov saw that here was something deserving of scientific study. He wondered if he could make the saliva flow at the sound of a bell or at a flash of light. His procedure, in the case of the bell, was first to sound the bell and shortly afterward to give the food. After this combination had been repeated a few times, the dog's saliva began to flow before the food was given, and this advance flow became more copious with further repetition of the combination. So the conditioned reflex was established for that day.

Next day the learned response seemed to have been lost, for on first sounding the bell there was no advance flow of saliva. But when the bell had been followed by food once or twice the conditioned reflex was reëstablished. By repetition of the same procedure on several days the conditioned reflex was well fixed and was retained over quite a long period of disuse.

In the experiment so far described, the bell was regularly followed by the food. What would happen if the food were omitted, after the conditioned reflex had been established? The first time it was omitted, the advance flow of saliva occurred; and also the second time; but after a few times the flow began to diminish and shortly there was no flow at all. The conditioned reflex had been extinguished for that day and hour. Provided the conditioned reflex had previously been thoroughly established, however, extinguishing it on one day did not prevent its appearing in full force the next day. It was more quickly extinguished the second day; and a series of such days left it permanently extinguished. The process of extinguishing a conditioned reflex was exactly parallel to that of establishing it.

Two other facts should be mentioned. The dog had to be hungry, otherwise no saliva would flow either to the food or to the bell. And he had to be awake. In a long experiment the animal sometimes fell asleep and then the bell had no effect.

The results of this experiment can be stated in several different ways. The usual statement is that the salivary activity became "conditioned," attached to a new stimulus, and later (through extinction) became detached again. But here is another way of stating the result which gives it

more value for us in our study of adjustment. The hungry dog was repeatedly confronted by a situation in which a bell sounded just before food was given. He quickly *became adjusted* to that particular situation, as shown by the advance flow of saliva. This adjustment was only temporary in the first instance but became more permanent when this peculiar situation kept recurring. When the situation was changed to one in which the bell sounded but no food followed, the dog maintained his old adjustment for a time and then became adjusted to the new situation, as shown by the cessation of the flow of saliva.

There are at least two other ways in which we can describe what happened. We can say that the dog registered the bell first as a mere noise, then as a noise preliminary to food, and finally as a noise preliminary to no-food. (The bell was originally no signal, then a food signal, and last a no-food signal.) Or we can say that the bell at first put the dog into no special condition of readiness, then into a condition of readiness for food, and finally into a condition of readiness for no food. Any one of these formulas describes the facts, though none of them has any value as an explanation. To explain the facts we should have to know what occurs in the dog's brain when these adjustments are made, and that is still an unsolved problem in physiology.

There are a host of adjustments akin to those of the dog in this experiment. When you have adjusted yourself to any state of affairs, you are "conditioned" to it, you have registered it, and you are ready for some suitable action. When on entering a room you find several persons busily engaged, you may at first be quite mystified as to what is going on, and may hardly know how to behave. You make yourself inconspicuous and observe. You see that the group is very serious about something and soon you notice one fact after another till you have registered the whole situation. You then know how to behave; you are ready to play your part; in short you are adjusted to the situation. You have become conditioned to the situation through a brief and rudimentary process of learning. You have been receptive and so have registered the facts, and as an active being you have got ready to act.

A person remains unadjusted to a state of affairs if he has not sensed it, or if the facts though seen have left no impression on him, or if he dislikes the situation and is unwilling to take the appropriate action. He may be unready to act because he does not want to act. His dislike and unwillingness may even prevent him from seeing the situation as it is and so lead to maladjustment, as we shall see a little later. The first step in adjustment is to face the facts.

CHAPTER VI

INTELLECTUAL ADJUSTMENT AND MASTERY

REMARKABLY effective adjustments are found in mental operations like reading and arithmetic, and in special laboratory exercises devised for the purpose of studying these matters. In one such exercise, the "opposites test," the game is to say the opposite of each given word. With this rule understood in advance the subject is handed a list of stimulus words, as for example:

rapid	difficult
wealthy	wicked
numerous	feeble
distant	quiet
ancient	costly

It may take a few moments to become adjusted to this peculiar game so as to stick to opposites without straying into other associations, but after a little practice one moves smoothly through the list, the opposites coming promptly and no other words obtruding themselves. One has become "set" or adjusted for opposites and grinds them out very efficiently.

Now let the rule of the game be changed, and synonyms be called for. The same list of stimulus words may be used, but now they suggest their synonyms instead of their opposites, because of the subject's different adjustment.

Let us shift once more to what is called "free association." The rule here is to say *any* word that first comes to mind on seeing each stimulus word. Various sorts of words now occur, here an opposite, there a synonym, another time a suitable noun to go with the adjective. Each stimulus word having many familiar associations is capable of calling up many different words when there is no adjustment for any special kind of response. When such an adjustment has been set up, as in the opposites test, miscellaneous words simply do not come to mind, but only words standing in the prescribed relation with the stimulus words. The adjustment forces stimulus and response to conform to a prescribed pattern.

Similar adjustments are present in arithmetical work. You may set yourself for adding, subtracting, multiplying or dividing. If you say to yourself, "Add these numbers," a pair of numbers immediately calls up their sum, but if you say "Subtract" you get differences, and so on.

12	10	6	9	20	8	30
6	5	2	3	4	2	3
—	—	—	—	—	—	—

One of the most skillful performances of man is silent reading. Consider how rapid it is. An average educated person reads five or six words a second, and a rapid reader eight or ten. If the words average five letters apiece, the rapid reader covers forty or fifty letters per second. As we saw before, he does not read the letters one by one, but registers words as units; and this ability to work in large units is one secret of mastery. Another secret lies in the influence of context; for the rapid rate applies only to the reading of words in context. A series of disconnected words cannot be read nearly so fast.

What we may call "context-adjustment" is the cause not only of rapid reading but also of clear understanding of what is read. Almost any familiar word has several familiar meanings, as the dictionary will show. But in connected reading only one meaning comes to mind for each word. Why do not the other familiar meanings obtrude themselves? It is the context, or better the reader's adjustment to the context, that keeps him on the right track. As he reads he registers the situation described in the story and becomes adjusted to it, and this adjustment acts like the adding-adjustment in arithmetic or like the opposites-adjustment in the test, and prevents confusion by holding him in readiness for the appropriate meanings of the successive words.

PROBLEM SOLUTION

We have been speaking of straightforward and smooth-running forms of mental activity, where the registration of the facts is easy. Suppose, however, that the situation is puzzling and the essential facts hidden from view. There is a problem to be solved, and the process of solution is never direct and straightforward.

For many years psychologists hung back from making any serious study of the process of thinking, believing it too complex to be unraveled. At length, about 1900, experiments on problem solution were undertaken, experiments of a rudimentary sort, in which the subject was given a problem to solve and was asked, after he had solved it, to review and describe the process. This was obviously an introspective experiment. The best problems for introspection are very concrete, as for example a mechanical puzzle. The process of solution was found to be about as follows.

The subject starts with a preliminary vague adjustment, a desire to solve this puzzle. He examines the puzzle and soon gets a clue which he follows up. Usually the first clue leads into a blind alley, figuratively, for the puzzle is like a maze in presenting many false leads. An impulsive subject behaves much like a rat in a maze, trying this lead and that with little deliberation

and reaching success only by accident. Still, he has registered the facts of the puzzle to some extent; and by degrees, in a series of trials, he comes to have a practical mastery of it.

A more thoughtful person makes fewer useless movements, but even he cannot proceed in a straight line to the solution of the puzzle. He has necessarily to do some exploring. But he tries out definite guesses or hypotheses and checks off those that are proved false. Some of his exploration may be mental rather than simply motor; that is to say, he may think through a certain line of action and see how it would come out, instead of impulsively trying it. From time to time he has a new insight into the puzzle, though some of his insights prove to be misleading. To have an insight is to register some new fact, some relationship or pattern. These insights are the high lights of the process of solution.

Thinking consists partly in making use of what has been previously learned, and insight is partly a seeing of old patterns in new situations. When the motor of your car is misbehaving you may remember what the trouble was on a previous occasion and so have a clue to the present difficulty. What you remember is sometimes a general principle formulated in words and easier to remember because it is expressed in words.

Indeed, words enter so largely into the process of thinking as to lead some psychologists to the conclusion that thinking consists in talking to oneself. One who is thinking hard is apt to be talking either audibly or silently. But talking is not the only activity that goes on in thinking. You may see a man gesturing all by himself while immersed in thought, or you may see him drawing diagrams in the air or on paper. In thinking out a journey he is apt to draw a map or to use a ready-made map. Maps and diagrams, like words, are symbols standing for the real things that are being thought about. The real things are often not present and the symbols take their place.

Symbols are useful in thinking because they are labor-saving devices, that is, thought-saving devices. The words "seven," "eight" and "fifty-six" are symbols of certain numbers and the sentence, "Seven eights are fifty-six," is a verbal symbol for a certain numerical fact. By repeating this sentence you know the product at once and need not laboriously count it up. Algebra is an elaborate system of symbols which greatly simplifies the solution of certain problems, because, once the problem is put into an equation, it can be worked out by a regular routine. You have to think in the full sense only at the beginning and at the end: once at the beginning to translate the problem

into the algebraic form, and again at the end to translate the algebraic answer back into the terms of the problem. You do not actually think in the symbols, but you use the symbols to avoid the trouble of thinking. The real thinking comes at the moments when you see what the problem is and what your symbolic solution means. Without this "seeing the point" there would be no real thinking and no solution of the problem.

My own conclusion then—not all psychologists would agree with me here—is that we think in words about as we walk in paths. Walking is easier in paths than elsewhere, but one can walk elsewhere and the paths are not the walking.

CHAPTER VII

ORGANIC ADJUSTMENT: EMOTION

THE adjustments described up to this point are calm and cool and rather intellectual. They have consisted in registering the facts of the environment and in being ready to act in the environment. There are other states of the organism which are far from cool and calm, but which can be called adjustments because they do register the environment to some extent and because they are states of readiness for certain types of activity. These states are what we call emotions.

After many years of barren attempts to describe and classify the emotions, some life was instilled into the subject about fifty years ago by James and by Lange, independently of each other, when they put forward the theory that emotion depended mostly on bodily activities, especially activities going on inside the trunk, in the heart, stomach, intestines and other viscera. The James-Lange theory is that there is lively internal activity during joy or anger and that the feeling of joy or anger arises from this internal commotion

and consists of a mass of sensations from all over the body but especially from the viscera. This daring theory immediately aroused much emotion in the psychologists of the day, and the discussion has gone on even to the present with the final word not yet spoken.

Whether or not this particular theory is true, we now have good evidence of visceral activity during certain outstanding emotional states, especially fear, anger and general excitement. The X-rays can be used for observing some visceral activities. Let a cat be lying comfortably on a table and digesting her dinner, while by aid of the X-rays you watch the regular waves of muscular contraction running from one end of the stomach to the other, the "churning movements" of the stomach. Now bring in a dog and let him bark at the cat for a few minutes. The cat's hair rises and she shows other external signs of fear or anger; and at the same time her stomach movements come to a halt and do not start again till the dog has been gone for some little time. Here then we see one definite organic change occurring in fear or anger.

Several other organic changes take place along with the cessation of stomach movements. The heart beats faster, the blood pressure rises, the liver discharges stored sugar into the blood, and

the spleen throws into the blood an extra supply of red blood corpuscles. All these changes are such as to make the animal ready for a fight, for running away or for any violent muscular activity. The checking of digestion releases blood for the general circulation, the increased heart action drives the blood rapidly through the muscles and lungs, the extra sugar is fuel for muscular action, and the extra red blood corpuscles help to carry the necessary oxygen from the lungs.

This organic state is aroused by the "sympathetic division of the autonomic nervous system"—the system which controls the viscera—with the help of the adrenal glands.

Here then we have an organic state of adjustment to danger and of readiness for danger. It is very useful to a cat or a man in actual fighting, and comes into play also in sham fights such as football. It comes into play also in students who are preparing for a "dangerous" examination, but here it may do more harm than good. It is probably of no service except where violent muscular activity is required.

Other organic states are not so well known physiologically, but there seem to be at least three: the contented and relaxed state during undisturbed digestion; the state of active sex desire; and the drowsy state. All of these states are adjustments

of the primitive type and are not specially favorable to the brainy sort of activity seen in thinking, mental work or skilled movement. You would scarcely put a person into any one of these states as a preparation for adding a column of figures, for solving a difficult problem, or for doing his best at fancy skating.

But just because these emotional states are primitive is no reason for despising them. They are useful, first, in primitive conditions; and in spite of civilization, primitive conditions still occur. Conditions occur in which we have to use our muscles desperately hard, and the organic fear-anger-excitement adjustment then stands us in good stead. Digestion, sleep and sex desire, though primitive, retain all their old biological importance. Can you imagine a state of civilization so advanced that these primitive organic adjustments would never need to be called into action?

More than that, man has found ways of taking up these primitive emotions and adjustments into his civilized life—ways of intellectualizing and socializing them. Sex desire forms the core of romance and of being in love. Anger forms the core of "righteous indignation" at injustice and social wrong. The primitive function of eating is dressed up and placed at the center of family life.

Sleep remains primitive but is surrounded by all sorts of refinements. As to fear, while civilized man has removed the serious dangers as far as he could, he plays with minor dangers in many ways, as in adventurous sports and in games of chance.

FEARS

Of all the emotions, fear has been most studied by psychologists. All sorts of fears are found in older children and adults, but the little baby shows very few. He clings if he is dropped or half dropped, he winces at a loud, harsh noise, and he may cry on these occasions as well as when he is hurt. Those are about the only fears you find in the little baby. He is not afraid of animals. About the first animal that frightens him is the frog with its sudden leap, and sudden, unexpected happenings of any sort seem to be potent stimuli to fear. As the child comes to take notice of a wider environment, he sees more dangers of being hurt or of getting scolded and consequently he finds more things to fear. Besides this natural development, he picks up conditioned fears in the way described in our study of learning (Chapter IV). Something hurts him, or he is punished for something, or he is warned to avoid some dangerous object, or he sees his elders showing fear, for example of thunder and lighting; and so he learns many things to fear.

A delicate indicator of slight momentary fear is known as the "psychogalvanic reaction." It is an electrical change in the skin, detected by aid of a galvanometer. A very weak current of electricity, too weak to be felt, is led through the body from one portion of the skin to another, and is also led through the galvanometer. If now a sudden startling stimulus is given, the current shows an increase, because the resistance of the skin to the passage of the weak electric current is decreased by reason of a slight momentary activity of the sweat glands. In effect, the subject breaks into a sweat, though a very slight one. This fear sweat is tied up with the visceral disturbance that occurs in fear and anger; it is a little part of that organic adjustment. It can be used to show what stimuli give rise to slight degrees of the fear-anger-excitement state. A loud noise will give the psychogalvanic reaction, a sharp electric shock will do it, and the anticipation of a shock will do the same. An unexpected touch on the skin is a sure stimulus, and so is anything that embarrasses the subject. When he is given a problem in arithmetic, he shows the skin reaction once when the problem is given him and again when he has an answer—as if, at the start, he was afraid the problem might be too difficult for him, and as if, at the finish, he was afraid his answer might be

incorrect. From these experiments it appears that the organic adjustment of fear is thrown slightly into action in surprise, expectancy, doubt and embarrassment, as well as in genuine fear, and that it must be active many times in the course of an ordinary day.

Rapid heart beat is another indicator of the organic fear response, not so dependable nor so delicate as the psychogalvanic reaction. In one laboratory experiment, a blindfolded subject was seated in a chair which without warning was suddenly tilted backward. The subject made a movement to save himself and his pulse became fast and strong. He reported a momentary rush of fear. A day or two later he was called back to the laboratory to repeat the experiment. This time his pulse was rather fast and strong before the chair was tilted, and the actual tilting had only a moderate effect on the heart; the subject was not frightened and did not try to save himself.

Here we have two important results. We see first an anticipatory organic adjustment, much like the dog's advance flow of saliva in the conditioned reflex experiment. We see also a partial extinction of the fear by repetition of the tilting. The subject, as we say, was somewhat used to the tilting the second time.

This getting used to a situation is itself an impor-

tant kind of adjustment, which goes by the name of "negative adaptation"—"adaptation" because it adapts or adjusts the subject to the situation, and "negative" because it consists in the dropping out of an act which originally occurred. We become negatively adapted not only to dangers that are apparent rather than real, but to objects that at first arouse our curiosity or interest. We cease to notice them after a few repetitions. Situations that at first embarrass or annoy us may become indifferent with repetition. Even a beautiful view from your window or a beautiful picture on your wall becomes so much a matter of course that you scarcely ever notice it except when you are showing it to somebody else. We lose as well as gain from negative adaptation, but on the whole it economizes our energy.

We cannot depend on negative adaptation, however, to rid a child of all the needless fears that he may have acquired. Some perfectly silly ones persist for a lifetime. Many are eliminated in adolescence, especially in boys, who like to be manly and try to prove to themselves and their fellows that they no longer fear this or that. They succeed in a measure but not completely. When the psychologist sets himself to eradicate a needless fear from the child of three or four years, he has a baffling problem on his hands. He cannot

depend on the influence of other young children who do not themselves have the fear in question, because they may ridicule the timid one so much as to upset him still more. Also they may catch the fear from him instead of curing him.

The psychologist has sometimes succeeded by a process of conditioning like that by which a fear is acquired, only that here pleasure and not punishment is attached to the object. One child who was terribly afraid of rabbits, but who had a good appetite, was given a nice lunch every day while a rabbit was in the room. The room was large and the rabbit in his cage was placed at the far end of the room and not moved any nearer than the child could stand without losing his interest in his lunch. Day by day the rabbit was moved a little nearer, but no more than the child would tolerate easily; and finally he could stand it right on his table and actually began to play with it. Seeing the rabbit while himself happy with his lunch made the rabbit an agreeable object; but if the rabbit had been brought close too rapidly, the chances are that the conditioning would have worked the other way, spoiled the child's lunch and made him afraid to have his lunch in that room.

There is no sure and easy rule for ridding a child of his needless fears. They should be prevented

rather than cured, and yet accidents will happen even to the most carefully sheltered child. We cannot expect to forestall all needless fears even in some golden psychological age of the future; but great improvement over present conditions is possible.

CHAPTER VIII

DIFFERENCES AMONG MEN

It would be a very incomplete psychology which left the impression that all men were to be regarded as equal in a psychological as distinguished from a political sense. Human society is based very largely on the existence of unlike individuals. Some very obvious differences are due to age. The human child develops so slowly that at any time a large fraction of the population consists of children who behave differently and are treated differently from adults; and certainly a society without children would not be typically human. Another class of obvious differences is due to special training, one adult being expert in one occupation and another in another, one having been brought up to use a certain language and to conform to certain manners, customs, beliefs and traditions while another is altogether different in these respects.

Besides these differences due to age and to special training, there are differences which seem more inherent, more characteristic of one individual as compared with another. Just as one

individual has red hair and another black, so one is more cheerful than another, or brighter, or more energetic; and such characteristics often remain the same from childhood to old age, no matter in what occupation the individual may be engaged or in what circumstances he may be placed. Such apparently inherent characteristics might conceivably be due either to heredity or to early training, and commonsense vacillates between these two explanations. Sometimes we say, "It's in his blood"—heredity—and sometimes we quote the environmentalist proverb, "As the twig is bent, the tree's inclined."

PSYCHOLOGICAL TESTS

In order to make a scientific study of individual differences and of their causes and effects, we need to have ways of measuring the individual's behavior and characteristics. We need to compare one individual quantitatively with another. Measurement is as important here as in other branches of science. It gives the investigator definite information to work with. A psychological test is a sort of yardstick for measuring the individual, one test being designed to measure him in one respect and another in another. There are tests of muscular strength, of keenness of eyesight, of memory, of reasoning, of intelligence, and of achievement in a given line of study or work.

To understand the general nature of tests we need to rid ourselves of certain misconceptions. The psychologist has no mysterious power, even by the aid of his tests, to penetrate the secrets of the individual's ability. Yet a test is not simply a lot of miscellaneous puzzles and trick questions thrown together on the spur of the moment. There is no mystery about the tests but there is a lot of technique. The test must be well constructed, carefully administered and correctly scored, in order to give a true measure. What the tests really do is to measure one individual against another, or, better, against many others, in fact against the population in general.

The nature of tests can be easily seen in the case of the "achievement tests," which measure proficiency in school subjects, in trades, or in any field where the individual has received special training. In arithmetic, for example, an achievement test consists of arithmetical examples, the same as an ordinary school examination. The main difference is that the achievement test is "standardized" before it is used. It is *tried out* on many children of different school grades, and grade norms are established, the sixth grade norm, for example, being the average score made by sixth graders in the test. The individual child's mark in an achievement test is not such and such a percent, but such and such a grade norm reached.

A child in the fifth grade may reach the sixth grade norm, thus showing superior achievement. An achievement test is very carefully prepared, and the try-out is an essential part of the preparation. A good test must possess the quality of *objectivity*, in the sense that the marking system is thoroughly worked out, so that there is no uncertainty as to how a given answer should be marked. As little leeway as possible is left for the subjective judgment of the one who marks the papers. Experiments have shown that an ordinary examination, marked in the usual way, will give very different marks according to who it is that does the marking; and even the same teacher, grading the same papers at two different times, will vary considerably in the marks assigned to individuals. In the preparation of a standardized test, great pains are taken to avoid this source of error.

A good test has two other qualities which need to be mentioned in order to show the real nature of tests. It must have *validity* and *reliability*. A test is valid if it measures what it is designed to measure, if it fairly represents the knowledge and skill achieved. If you wished to prepare a comprehensive test of the grade school child's achievement in arithmetic, you would have to include examples of various kinds; if you included only columns of numbers to be added, your test would

not have validity. A test is reliable if it affords little room for chance successes and failures. Usually a standardized test is prepared in duplicate, so as to furnish two equivalent tests (which, of course, must be found to be equivalent by actual try-out). If the test is reliable, the individuals tested obtain the same marks on the two duplicate forms, while if the test is unreliable there is much shifting of individuals up and down the scale. No test is perfectly reliable in this sense, because the individual himself is a variable quantity and will do better one day than another. Nor is any test perfectly valid; for the achievement we are trying to measure, being broad and varied, cannot be perfectly sampled by any particular set of tasks or questions. But a scientifically constructed test has much more of these desirable qualities than could be had without such painstaking labor as the psychologist puts into the construction and standardization of tests.

Similar in principle to the school achievement tests are the trade tests designed to measure the individual's expertness in his line of work. Rather different in purpose are the vocational aptitude tests which aim to indicate how much promise the individual shows for a given occupation, *before* he has received any special training in that occupation. Such tests may be used by the employer in

selecting the "best bets" from among the candidates for a certain position, or they may be used by the vocational adviser in steering the individual towards a vocation suited to his abilities. It is easier for the psychologist to be of service to the employer than to the young person about to choose a vocation. For the psychologist is sure to make some mistakes in either case, and an occasional mistake is less serious to the employer than to the individual who is steered in the wrong direction.

The difficulty with vocational aptitude tests is one of "validity." It is a question of finding real indicators of future success in a line which the individual has never followed as yet. Fairly good indicators have been found for certain vocations, as for office work, shop work, and music. Often the vocational adviser is able to warn the young person *away from* some occupation for which he clearly is not fitted. Tests revealing the person's likes and interests make good indicators as between certain professions, law, medicine and engineering. And the intelligence tests, which we have still to discuss, are of great value in vocational guidance. The problem of finding suitable jobs for people of various aptitudes is so important that much work is being done on it and some progress being made.

INTELLIGENCE TESTS

From the achievement tests and aptitude tests so far mentioned, it might appear that the psychological test is designed exclusively for practical purposes. As a matter of fact, a test is in itself merely a measuring device and, like a yardstick, a balance, a clock or a thermometer, is capable of being used either for practical purposes or as a tool in scientific investigation. The first tests were intended for the latter purpose. They were used to measure individual differences in the hope of throwing light on the influences of heredity and environment responsible for the differences. These first tests were designed to measure such special abilities as quickness of reaction, keenness of sense perception, memory for numbers, and vividness of imagination. The first psychologist to attempt a test of general intelligence was Binet, about 1900. He got into this testing work from the practical side, being commissioned to discover why some children in the Paris schools were backward in their studies, whether from lack of ability or from laziness. The teachers were inclined to the latter view, but Binet set out to find the answer by measuring the children's intelligence.

Easier said than done! Binet could not find

any good single index of intelligence. Reaction time was not a good index, nor memory span, nor any single test. He decided to assemble a large number of intellectual tasks and to take the pooled result from the collection as a measure of general intelligence. Avoiding tasks from the school subjects, he selected problems based on information that is picked up by the child in his life outside of school. For example, he asked the child to name the days of the week, to copy a square, to count backwards from 20 to 1, to tell the difference between wood and glass. Many of the questions required the child to do something new, though based on what he had previously learned.

Binet did much more than simply assemble a set of questions and tasks. He made a scale of such test items, extending from easy ones that were done successfully by the average child of three to difficult ones that could not be done by the average child before the age of fifteen. Each question was tried out on many children in order to see at what age level it belonged, and the whole scale was standardized and age norms worked out. If a child does as well in the tests as the average eight-year-old, he is described as having a *mental age* of eight years.

If a child's mental age is exactly equal to his chronological age, he is exactly an average child

in intelligence, i.e., in the intelligence measured by the tests. If his mental age is greater than his chronological, he is above average. The mental age has to be compared with the chronological in order to determine whether the individual is bright or dull. The mental age may be divided by the chronological, giving the "intelligence quotient." The exactly average child, with a mental age equal to the chronological, has an intelligence quotient of 1.00, usually called 100. A child of eight with a mental age of ten has an intelligence quotient of $10/8 = 1.25$; while another child of eight with a mental age of six has an intelligence quotient of $6/8 = .75$, usually called an I.Q. of 75.

The individual child's intelligence quotient remains nearly constant from year to year. If it is 100 at the age of six, it will usually be found to lie between 90 and 110 at the age of twelve. If it is 75 at the earlier age it scarcely ever rises to 100 except in cases where some serious handicap, such as poor eyesight, is corrected. If it is far above 100 at the earlier age, it practically never sinks as low as 100 later. In old age, to be sure, mental alertness is apt to decline, and an adult or adolescent may succumb to a mental disorder and fall far below his former level. But on the whole the intelligence quotient remains so nearly constant as to seem an inherent characteristic of the individual.

Intelligence as measured by the tests corresponds rather closely with ability to master the ordinary school subjects. The child with a greater mental age will usually make the higher score in an achievement test—usually but not always, for the child of relatively low intelligence receives the more prodding while the child of high intelligence is not motivated to work up to his limit. When special classes are arranged for the children of high intelligence, with the privilege of advancing at their own pace, they make remarkably rapid progress. Occasionally we find a gifted child whose school achievement is poor owing to emotional disturbance and maladjustment at home.

INDIVIDUALS DIFFER IN DEGREE RATHER THAN IN KIND

One of the important scientific results of the intelligence tests is the clear proof that people do *not* fall apart into separate classes, such as feeble-minded, normal and superior, any more than they fall into the three classes of tall, medium and short. When we measure the height of a large sample of people, we find no separation into classes but a continuous gradation from the tall extreme to the short, with the great bunching of cases towards the middle. In the same way, intelligence quotients show a continuous gradation from

low to high, with cases bunched around 100, which is the average for the whole population. There are as many cases above 100 as below, and the further from 100 you go, either up or down, the fewer cases you find. About 60 per cent of the population have I.Q.'s between 90 and 110, about 20 per cent below 90 and about the same above 110. More in detail, the distribution is as follows:

I.Q.	Per Cent of the Population	I.Q.	Per Cent of the Population
70 or below	1	101–105	17
71–75	2	106–110	13
76–80	3	111–115	9
81–85	5	116–120	5
86–90	9	121–125	3
91–95	13	126–130	2
96–100	17	Above 130	1

The few individuals below 70 scatter all the way down to practically zero. The few above 130 scatter all the way up to about 180.

This continuous gradation from one extreme to the other, with a piling up of individuals near the average, is found in every ability that has been measured, whether it be strength of grip, or reaction time, or memory span, or keenness of eyesight. There have recently been developed ways of measuring attitudes, for example the tendency towards radical or conservative views. Such a test is con-

structed like the intelligence tests to the extent of containing many items; it calls for expression of attitude on this, that and the other particular question. Continuous gradation is found here, too, with a piling up of individuals in the middle between the extremes. The average may shift to one side or the other as radical or conservative influences are brought to bear on the population, but still there will be a heaping up of individuals near the average and a thinning out toward each extreme.

Individuals differ in many directions or dimensions. One interesting dimension is that of introversion-extroversion. Introversion was first defined as an inclination to turn attention inward, to think by oneself, to daydream, while extroversion was the tendency to be interested in what was going on in the environment. A better definition seems to be emerging according to which extroversion is the free and confident participation in social activities, and introversion a liking for solitary activity. The original theory was that mankind was divided into two types, the extroverts and the introverts. Next it appeared that there was also an intermediate type; and now that tests for measuring introversion and extroversion have been introduced, it is found, once more, that there is a continuous gradation from one extreme to the

other, with the great mass of individuals falling in the middle.

ARE INDIVIDUAL DIFFERENCES DUE TO HEREDITY OR TO ENVIRONMENT?

That men do differ we have always known and now that we have the tests to measure men we see the differences more clearly than ever. We should like to know the causes that make men differ.

The causes that one thinks of are heredity and environment. It is hard to think of any possible cause—apart from age or degree of maturity—that does not belong under these two heads. Heredity here means the native constitution of the individual, with which he began life; and he began life, of course, not at birth but some nine months earlier at the moment of conception, when a spermatozoon from his father united with an ovum from his mother to form the fertilized ovum. His heredity was contained in that fertilized ovum, and all the other causes that affected his development, in either prenatal or postnatal life, were environmental causes. If the mother during pregnancy was in poor health, that was an environmental cause affecting the child's development. If his food during infancy was good and abundant, that was an environmental factor. All his training, all the stimulation to activity he received and

all the opportunities for growth and learning that came his way, belong under the head of environmental factors.

But the environmental stimuli would have no effect unless the living individual were there to respond according to his hereditary characteristics. Heredity and environment work hand in hand. Each being absolutely essential, it is absurd to ask which is the more important for the individual's life and development. But when we are concerned with the *differences* between man and man, there is nothing absurd in asking whether they are due to heredity or to environment. It is a fascinating scientific problem, and one of practical importance as well. We can control heredity to some extent for the coming generations, and environment to some extent. Shall we depend upon heredity to multiply the best sorts of individuals, or upon environment? To answer this question we need the scientific knowledge of heredity which the biologists are giving us, and we need a scientific study of environmental influences affecting the development of the child. Our psychological tests, by giving us a more exact knowledge of each individual, can assist materially in the solution of the problem; but it must be admitted at the outset that the problem is not solved as yet.

Some differences are obviously due to special training and so to environment. Of two musical children, one has studied the violin and the other not, and their difference in violin playing is due to this environmental factor. On the other hand, when two children take violin lessons, one may make much more rapid progress than another, and this looks like a difference due to heredity, though we cannot be sure of our conclusion here because one child may have had better environmental encouragement than the other.

The fact that the individual's intelligence quotient remains so nearly constant looks as if we had here an inherent characteristic of the individual, a hereditary factor. If we could give the newborn baby an intelligence test, and should find one baby to differ from another even then, we should be almost compelled to attribute the difference to heredity. At two years of age, children can be quite well tested and are found to differ, and the child who tests high at this early age is likely to test high ever after. Moreover the children of intelligent parents are apt to test high even at this early age. All this looks like heredity, but there are skeptical environmentalists who point out that the early home environment may have a tremendous influence on the child's mental development. We know too little about early

environmental influences to say yes or no to this proposition.

The only way to reach a convincing answer to this ticklish question is to take babies of differing heredity and subject them from birth up to the same environment. If then they prove to have differing intelligence, etc., the differences must be due to heredity. It would be very difficult to carry out such an experiment perfectly, but the careful study of foster children is doing something along this line. A parallel check on the influence of environment would be to take children of the same heredity, bring them up in different environments, and see whether they develop differently in intelligence, in musical ability, in character and temperament. But what children have the same heredity? Not brothers or sisters, for they differ among themselves even in such matters as hair color and eye color, and we know from the biologists that two fertilized ova from the same parents may differ considerably in the hereditary traits which they carry. The only children who have practically identical heredity are pairs of "identical twins." Such pairs result from the splitting of a single fertilized ovum and have the same hereditary traits. Consequently they look so much alike as to be scarcely distinguishable. The resemblance extends to such details as the finger prints.

Identical twins are marvelously alike in their development and behavior. When brought up together they test almost the same. Yet they may not be quite identical; one may show a slight superiority to the other, but they are much more alike in intelligence than ordinary brothers or sisters, and even than twins of the non-identical type, who come from separate fertilized ova and are simply brothers or sisters born at the same time.

Occasionally a pair of identical twins is found who have been reared apart, one perhaps in the country and the other in town. A few such pairs have been tested and have been found very much alike, though perhaps not quite so much alike as identical twins who have been reared together. The evidence is still rather scanty but certainly indicates that heredity is a genuine factor in producing differences in mentality, and that environment is also probably a factor.

DIFFERENCES BETWEEN RACES AND SOCIAL CLASSES

It is quite possible that the races of mankind differ in intelligence and in emotional and personal traits as they certainly do in color, stature and other physical traits. It is possible but hard to prove or disprove. We cannot judge the native ability of a race from its civilization at any time, for the advanced races have come up from a primi-

tive condition without any great change in their racial heredity. The wild Germans of Caesar's time probably had the same degree of native intelligence as the Germans of today. When the intelligence tests are tried on samples of different races, here in America or in Hawaii, the Whites, Chinese and Japanese are found to average about the same, with the Negroes and Indians rather lower down. But we must not jump to the conclusion that Whites, Chinese and Japanese are superior in native intelligence to Negroes and Indians. The difference may be environmental rather than hereditary, cultural rather than racial. In other words the tests may not be equally fair to the different groups. The tests necessarily call for the utilization of the individual's past experience, and can be used to compare the native abilities of those, only, who have had equivalent experiences. When a white man constructs an intelligence test, primarily for testing white children, he draws upon the common experiences of white children and is sure to introduce matter that is unfamiliar to children of a very different background. Country white children are found to score lower than city white children, and country children moving to the city seem to improve. The reason may simply be that the tests are based upon the common experience of the city child more

than on that of the country child. So when we find samples of city Negro children surpassing some samples of country white children, we wonder whether the difference may not be entirely a difference of background.

When children in the same school, but coming from homes of different occupational groups, are given the same tests, the children of professional parents rank the highest, those of business men next, then those of skilled workmen and finally those of unskilled laborers. This difference appears even in the kindergarten. The reason may be that the more intellectual men have got into the more intellectual occupations and that the children take after the parents. But there is also a chance, once more, that the tests, prepared as they are by professional men and women, are better adapted to the background of the child from professional people's homes than to the children of artisans.

How about sex differences? The past century has witnessed a mighty experiment on young women. While woman's practical ability must always have been recognized, a century ago they were supposed to be incapable of the higher intellectual life, and consequently of the higher education. Some women of that time did not agree, and before long were starting up colleges or "seminaries" for

young women. By now the result of the experiment is clear. Women are under no handicap in the higher education. When the intelligence tests came along, they showed girls and boys just about on a par, age for age. In memory tests and in language tests the girls are apt to excel, while boys excel in tests of mechanical ability. These differences may be due to early training, though this is not certain.

One thing is certain which has not been brought out above. Whether we are comparing the sexes, the social classes, or the races, we always find a large overlap between them. Each group will show the continuous gradation from high to low extremes, and these gradations will overlap. The average Indian may score lower than the average Chinaman, but many individual Indians surpass many individual Chinamen. If we take men as individuals, the bright ones are not all found in any particular races or classes. So much our tests have proved, even if they are still too little developed to afford a sure measure of race and class differences.

CHAPTER IX

DESIRES AND MOTIVES

If REWARD and punishment are as important as we found them in our study of learning and gaining mastery, there must be motives to which the reward and punishment can make an appeal. For it is quite clear that an individual who had no preferences and was indifferent to what happened to him could neither be rewarded nor punished. It is because the hungry rat is not indifferent to the food he finds in the food box that we can use that incentive in getting the rat to master the maze. It is because the man is not indifferent to an electric shock in his finger that we can use that incentive in getting him to move his finger more quickly than he otherwise can or will.

An incentive is the reward or punishment that comes as the result of an action, and a motive is the preference to which the incentive appeals. When food is the incentive, hunger is the motive; when an electric shock is the incentive, the avoidance of pain is the motive.

In this broad sense, a motive need not be con-

scious. We were discussing in another chapter the regulation of body temperature. We said that maintenance of the normal temperature was a "major requirement" of any warm-blooded animal. If this normal temperature is threatened by external heat or cold, the animal sweats or shivers or in other ways adjusts himself to the situation while preserving his body temperature intact. He has no conscious preference for that particular body temperature; even a man has no such conscious preference, though he does consciously dislike great heat or cold. But he has a physiological preference for the normal body temperature, and acts accordingly. There are other needs of the organism which are not understood by the individual and yet are there and have their effects. Usually they give rise to discomfort and restlessness, as hunger does in the newborn baby who cannot be supposed to have as yet any conscious desire for food. Later he learns what he wants when he feels that way. The point is that we do not know our preferences from birth, but have to find out about them from our own experience. Some of them we never do get to know except vaguely.

Some of these preferences are there from birth or develop as the individual matures without having to be learned. Others are learned, acquired. We speak of native tastes and acquired tastes. Sweet

is preferred to bitter, and a smooth tone to a grating noise, without any learning or "conditioning," but one must learn to like olives. Probably gay colors are naturally attractive, though this liking does not appear till some time after birth. The child early shows a liking to explore objects with his mouth, hands and eyes, and to manipulate them as far as he is able. Sex interest, according to Freud, is present from birth, though he admits that it becomes "infinitely stronger" and more definite with adolescence. He says that this motive is active up to about five years of age, then disappears from the child's behavior or "becomes latent," to reappear at adolescence. Both the early active period and the latent period are open to much doubt, since they are inferred from a general theory rather than from the observed behavior of children. There are some other psychologists who are inclined to deny that there is any natural interest in the other sex. They admit certain physiological needs connected with the sex organs, but say that all the rest of sex interest and behavior is picked up from the social environment. This conception of the matter is hard to reconcile with the behavior of animals and even with that of men and women, though it is true that by the time adolescence arrives the individual has had a chance to pick up a great deal. Human behavior is an

extremely complex interweaving of the natural and the traditional, the unlearned and the learned.

There has been an immense amount of discussion as to what are the primary motives of human life. Schopenhauer, about a century back, spoke of the "will to live" as the one motive of life; but so general a motive might split up into any number of particular needs and desires. Freud in his earlier works, beginning in the '90s, reduced the active motives mostly to the "libido" or sex motive (or love motive or pleasure-seeking motive), but he always felt that there must be a duality of fundamental motives and in his later theory he combines the libido with the ego motive (self-preservation and self-assertion) into one total life-motive, equivalent to the will to live, and opposes to this nothing less than a death-motive, a will to die. This death-motive works mostly "in silence," without revealing its presence, but it does show itself in the longing for rest or for Nirvana and also, directed outwards, in cruelty and destructiveness.

Alfred Adler, once a disciple of Freud, rather quickly diverged from him on the question of the relative importance of the libido and the ego motives. For Adler, the great positive motive of life is self-assertion or the "will for power," the desire to dominate and be superior. The great difficulty

of life he sees not, like Freud, in baffled sex desires but in the feeling of inferiority.

From a broad biological standpoint the activities of living creatures are summed up under the two heads of self-preservation of the individual and propagation of the species, and self-preservation and reproduction have accordingly been called the primary motives. But it is impossible to regard self-preservation as a single motive, since it covers the two radically different organic adjustments of eating and digestion on the one hand, and of self-defense on the other. We must accept at least three primary needs of the organism: that for food, that for safety, and that for sex activity. Hunger, fear and sex have accordingly been put forward as the primary life motives.

Looking at human behavior from a different angle, sociologists have suggested a different list of broad, inclusive human desires:

The desire for new experience;
The desire for security;
The desire for response (including love);
The desire for social recognition.

In contrast with these very short lists of primary motives are the much longer lists of "human instincts" that are proposed by some psychologists in the effort to do justice to the great variety of human motives as we find them in everyday life.

An instinct is properly a behavior tendency which is inherited by the individual and not acquired by learning. It is exceedingly difficult to isolate an instinct out of the complex adult behavior of man. How much of human love-making, for example, is traceable to a sex instinct and how much is picked up from the environment? It is very difficult to say. It is difficult to isolate the unlearned core of any type of adult behavior, and consequently psychologists have become wary of assuming definite human instincts. Yet the so-called instincts deserve notice because they are undoubtedly very common among both primitive and civilized men. They represent relatively primitive and universal human motives, and many of them are not limited to man alone. Here are some of them:

Hunger and food-seeking;
Thirst;
Escape from pain and danger, fear;
Resistance to constraint and interference, anger;
Curiosity, exploring;
Manipulating objects;
Seeking company, herding together;
Submitting, following a leader;
Self-assertion, mastering;
Mating, sex desire;
Caring for the young, motherly love.

There are many other lists, longer and shorter, but none of them can claim scientific validity.

We have made only a beginning in the study of motives. We must examine the child's development much more fully before we can trace adult behavior back to its beginnings, or adult motives back to primitive needs. Many of the names in the lists cover whole classes of specific desires. Actual motives are often very specific. The baby wants a particular toy and nothing else will please him at the moment. At a given time a person is trying to escape from a particular danger, not from danger in general, or to win the love of a certain person, not of people in general. He wishes to win this game, to solve this problem, to succeed in this task. Motives arise and develop in the course of activities. Once you have made a good start in a certain enterprise and are interested in it, your motive is to carry the enterprise through. You may have started on it as a means of earning your bread and butter, but you lose sight of that ulterior motive as you become absorbed in the activity itself.

The usual lists of motives do not do full justice to the social interests of mankind. Man is often called a "social animal," and certainly he shows great interest in social activities. It is a pleasure to participate in the work of a good team. The team can do big things which are beyond the power of the individual, and group activity also

has a complexity that is stimulating. When the "morale" of a working group is high, that means that the individuals composing the group are pulling well together and like to work as a team. They like each other, and have confidence in their leader. Their work appears worth while and is so laid out that each member of the group can feel that he is playing a real part and accomplishing something toward the goal of the whole organization. Under such conditions there is real zest for the work.

MOTIVATION

Ordinarily most of us jog along at an easy gait, keeping up to a moderate standard, but not working anywhere near our limit. If a suitable incentive is applied, we start to improve much as the beginner does. If school children who know very well how to do a certain kind of example in arithmetic are made the subjects in an experiment and told that their records are being taken, immediately they begin to do those examples more quickly, sometimes but not always making a few more errors. If next a bar of chocolate is offered to every child who will reach a certain standard of speed, the speed goes up again; and if they are told that the one who makes the highest score, or the most improvement, will receive special mention,

the speed goes up still further. Or, in another experiment, let the children be praised for their good work, or else reproved for poor work: in either case their score goes up further than when nothing is said.

One of the most dependable workaday incentives is "knowledge of results." Let there be some gauge or measure of the performance, so that each person can see at once how well he has done and how much he has improved over previous trials, and you are apt to see continued improvement. This form of incentive has been used successfully in many different kinds of performance. For example it has been used in rehabilitating soldiers who were recovering from an injury to the arm or leg. If you simply told the soldier to raise his arm as far as he could, he did what he could; but if you had an arrangement for measuring how far he raised his arm and indicating his little gains from day to day, his progress was much more rapid. This incentive might be called the incentive of the definite goal which is attainable but only with effort. A goal within easy reach is unstimulating, but one away out of reach is discouraging. No use to pit the beginner against the finished expert, if you are trying to motivate the beginner; better match one beginner against another, though the expert is an inspiring ideal as an ulti-

mate goal. The athletic field affords excellent examples of motivation by definite and immediate goals.

CONFLICT OF MOTIVES

If we continued in this cheerful tone, leaving out the darker side of the picture, our psychology of motives would be very incomplete. Desires may be a nuisance and may hamper activity as well as carry it along. Desires may be frustrated either by outside obstruction or by internal conflict.

The spontaneous reaction to an external obstruction is to put in more effort and force the obstruction. Anger may develop and with it a spurt of muscular energy, which is all to the good if muscular strength is what the situation demands. A less direct but often more successful way of meeting an obstruction is to make a detour, to explore and find a way around. Exploration may take a mental form and then we have thinking and problem solution as a way of avoiding an obstruction and reaching the goal of a desire. Sometimes, however, the obstruction can neither be forced nor dodged. Or the desire may not be important enough to justify the time and effort needed to overcome the obstruction and reach the goal. There is such a thing as being too determined, too

stubborn, when the goal is not essential and when the desire is not a "major requirement" of the individual or group. Instead of mastery, adjustment may be needed, and the question is whether the individual can adjust himself happily so as to continue his major activities undisturbed. Trouble often arises here.

When a desire is obstructed by another desire of the same individual, so that a conflict of motives arises, the situation would seem to be well within the individual's control and to offer no great difficulty. He would meet the situation, we might suppose, simply by deciding which desire to follow and which to leave behind. This would be entirely rational, but unfortunately man is not entirely rational when strong desires are aroused. He may be unwilling to leave either desire behind, so that decision is a hard struggle for him. Once he has reached his decision, he usually stays decided, and does leave the rejected desire behind. Two courses of action may have appeared almost equally good to him, but now that he has committed himself to the one he is inclined to poohpooh the other as much inferior to the line he has chosen. This belittling of what one has rejected may not be strictly rational, but it is normal and a great help towards decisive action.

So far we have seen nothing very irrational.

But suppose a man has not the sense, nor the force, to break cleanly with the rejected desire. Suppose he tries to compromise with it in some ineffective way. He then carries the half-rejected desire around with him as a disturbing element in his life. He is only half-hearted in his chosen course of action because of the contrary motive still present in him. He fails to carry his chosen line of action through to mastery and he fails to reach a good adjustment to his environment. Some men tie themselves up into incredible knots by compromises and half measures. What makes matters worse is that motives are often mixed, obscure and hard to understand. A man may not know what he wants or what want he is trying to satisfy by some compromise. To himself he may seem a quiet, inoffensive person, asking only to be left free and unmolested and to live his own life in peace—while all the time he is hungering for social recognition and power.

These conflicts of motive, unsolved personal problems, compromises and false impressions of oneself are causes of much of the failure and maladjustment which we shall consider in the next few chapters.

CHAPTER X

MALADJUSTMENTS

With all the changes that man has made in his environment during the past century, you would expect to find him better adjusted to his environment than ever before. Dangers have been eliminated, health conditions improved, physical labor diminished, transportation and communication made easy and quick, household conveniences multiplied, education made available and amusements put within reach.

> "The world is so full of a number of things,
> I'm sure we should all be as happy as kings."

But are we sure that kings are happy? There is the possibility of having so many things, and even so many good things, that one is simply bored by them. There is the possibility of making life too easy, for if life is altogether easy, what is there to live for? A child brought up by successful parents, with all his wants supplied, may see nothing to strive for and be only a listless performer.

Even if the changes we have been making in our environment are ultimately for our good, it

will take time for us to become well adjusted to them. When the changes have been rapid there is bound to be some lag in adjustment.

On the whole man is showing surprising readiness to take up new inventions and get along in his new environment. Yet there are some indications that maladjusted individuals are more common than they were a century ago. It would seem that there are more insane people now per million of the population, more neurotic people, and more criminal or delinquent people. I say it would *seem* so, not that it is so, for the statistics of such matters are difficult to interpret. We know that there are more insane people cared for in institutions than formerly and that the number keeps on increasing, relative to the total population; but this is largely because there are more and better institutions, and that insane persons who would formerly have been kept at home now go to the institutions. Then too, scientific medicine recognizes milder degrees of insanity than was formerly possible. The standard of sanity, we may say, has been raised.

Milder than any form of insanity are the maladjustments known as neuroses, and here again it would *seem* that neurotic individuals have been increasing in number and percent. Yet the fact may simply be that science now recognizes these

conditions and that the medical profession has learned how to do something for them. A century ago the neuroses were scarcely known. One of them, hysteria, had indeed been known for centuries, with its peculiar fits, and its baffling losses of sensation or muscular power or appetite; but it was not thought of as a maladjustment or mental condition, but as a disease of the womb. Along in the nineteenth century other neuroses came to light and were named neurasthenia, psychasthenia, fear neurosis and the like. For a time there was a fad for multiplying names. A host of eccentric fears received names such as "agoraphobia," the fear of open squares and streets, and "claustrophobia," the fear of closed rooms and narrow spaces; and there were also a lot of "manias" such as kleptomania and pyromania. The supposition was that each of these names stood for a separate neurosis, but Janet, near the close of the century, urged that the essential condition in all of them was the same, a lack of zest and readiness for action, a lack of courage and confidence in coping with one's duties and with one's fellows. Freud shortly afterwards began to make much of conflict of motives, compromises and repressed desires, especially (or altogether) in the sphere of sex, as the source of neuroses. Adler sought the source in the desire for power, frustrated by a sense of inferiority.

The World War was a drastic psychological experiment intended, so it might seem, to discover how much strain and hardship the human organism could stand. You would think that trench life under heavy bombardment would make everyone cave in and the remarkable fact was that so few, relatively, succumbed to the war neuroses—to "shell shock" as it was called at the time. In those who did succumb the trouble was not a physical shock to the brain, as was at first supposed, but the unresolved conflict between the desire to escape and the desire to be a man and do one's bit as a member of the group.

Though fully fledged insanity or even neurosis is scarcely found in the child, there are many "problem children." They are maladjusted, they suffer from conflict of motives, or they are seeking security, adventure, love or social recognition by devious ways and without understanding themselves.

Neurotic individuals differ greatly not only in the symptoms of maladjustment which they show but probably also in the source of their trouble. To force all the cases into one formula is artificial. A frustrated desire or need is perhaps present in all cases, but sometimes it is one need and sometimes another, and sometimes the need is blocked by external obstruction rather than by inner con-

flict. Certainly inner conflict is very common, and one sign of it is the sense of guilt that is observed in very many neurotic individuals, who may be innocent of any wrongdoing but who feel some desire within themselves that seems wrong to them. They have a sense of inadequacy, of disharmony with the world, and of guilt. Many of them are willing and eager to talk about their troubles and to explain at length what poor creatures they are. In a word they are suffering not from disease in the ordinary sense of the word but from maladjustment.

TREATMENT OF MALADJUSTMENTS

Just as a machine out of order reveals how it is supposed to work, so the study of maladjustment throws light on normal psychology. The same is true of the modes of treatment which have any success in improving the adjustment. It is remarkable what a variety of treatments have had some success in the treatment of neurotics—though no form of treatment can claim complete success.

Historically, the first mode of treatment was hypnotism, or mesmerism as it was called at the beginning of the nineteenth century. It was, and is, used for two purposes: to discover the origin of the patient's trouble and to clear the trouble

away. Under hypnosis, which is a sleep-like state induced by suggestion and a state in which the subject is very suggestible, events can be remembered which are lost from the subject's waking memory, and a suggestion that his trouble is now a thing of the past often takes effect and leaves him free from that particular trouble. According to some successful practitioners, the suggestion should always be positive and cheerful, making no reference to the trouble but assuring the subject that he is going to be well and strong. The idea here is to induce the subject to set his face towards health and normal activity and away from the notion that he is an invalid. The same idea lies back of the various forms of faith cure, Christian science, religious healing and metaphysical healing, and also back of the methods which use moral suasion in the effort to induce the subject to adopt a strong and hopeful attitude. If he can be brought to discard his pet idea of being an invalid and a poor creature, and to adopt the idea that he is essentially a well person and on the road to complete health, the battle is half won.

Quite different is the method of psychoanalysis as practiced by Freud and his followers. They insist that the subject cannot possibly set his face towards health till he has wrestled with his maladjustment and overcome it. He must first face the

facts of his past life and present bad condition. He must recognize the desires that he has been compromising with and work out an adjustment that will take care of those desires. The suppressed desires are brought to the surface by relaxation, by open confession, and by dwelling on the subject's dreams and memories. Significant past experiences are revived as far as possible, the subject doing the work and the analyst standing by to keep the subject to his task and to help him see the meaning of the recovered memories. As the analysis proceeds, the subject's desires center upon the analyst who, maintaining in himself an objective and professional attitude, is thus placed in a position to guide the subject towards a satisfactory adjustment. Finally the subject must be weaned from his dependence upon the analyst so as to go on by himself.

This process of analysis is apt to take a long time, but it is cut short by some analysts when dealing with maladjusted children. The analyst wins the child's confidence and with him studies the situation, going back into the past somewhat to seek the origin of the trouble, and getting the child and his parents as well to face the facts.

Facing the facts is a registering of the facts and so is quite in line with the "first step in adjustment" of which we spoke in an earlier chapter. It

seems the correct theory, but how then shall we explain the success of those modes of treatment which make little of the subject's past and simply seek to generate in him a healthy and confident attitude towards the present and the future? Probably, after all, the most important facts to face are those of the present and future. Some persons respond better to one mode of treatment and some to another. Several other modes of treatment have been used with some success, and it almost seems that success depends less on the practitioner's technique than on his personality. These neurotic subjects wish to tie up to somebody who inspires confidence, and the difficulty is to get them to stand alone. Whatever treatment is used, it has to be completed by a gradual process of re-education. The subject, not yet sure of himself, is given relatively easy tasks to master, relatively simple situations in which he must adjust himself. As he gains confidence he is made to meet harder problems, and so on till he has courage to resume his regular work and social relations.

What society needs is not so much a cure for the neuroses as prevention. The best hope lies in study of the problems of the child and of the adolescent, and in preparation during early life for the adjustment problems that are coming in adult life.

We can see from what has been said how difficult it is to make sure whether the neuroses are on the increase in our civilization. With every fresh advance in the knowledge of the neuroses and in modes of treatment, a new class of neurotic persons comes under observation, and thus the number under observation increases even though the number actually existing remains the same. Conditions may be growing harder for adjustment, with the increasing speed of life, the more exacting standards, and the withdrawal of so many persons from the performance of concrete tasks where the goal is definite and tangible. So many of us are becoming paper workers and so many are confined to repetition of very small tasks that the sense of real achievement may be lost and little zest for action remain. Such a conclusion is purely speculative but may serve to make us keep our eyes open for further light on this important question.

CHAPTER XI

MORE SERIOUS MALADJUSTMENTS

The past century has seen notable progress in the study of the mentally abnormal and maladjusted. A century and a half ago, these unfortunates aroused no scientific interest. They were not regarded even as medical problems. Insanity was often thought to be a demoniacal possession or a league of the individual with the devil. The insane were brutally treated, often being chained in filthy dungeons in the charge of guards of the roughest sort. The first step towards the modern era was taken by Dr. Pinel of Paris in 1792 and it appeared at the time as a very bold and reckless step. He struck the chains from the insane in an institution of which he had become the head. He believed that the insane could be trusted without chains, and the result was as he hoped: the inmates of the institution were better behaved and less insane in their actions when relieved of this restraint. Thus was inaugurated a large-scale, century-long experiment on human behavior and motivation, conducted by psychiatrists in the institutions for the insane.

It took most of the nineteenth century to complete the reform begun by Pinel. Throughout the earlier part of the century many forms of restraint and force were still applied to the insane, to tame them, on the theory that force would bring them back to their right mind. Conolly in England in 1839 was the first who dared to throw out all forms of forcible treatment. He found that the insane were not nearly so dangerous as they had seemed and that most of their violent actions were called out by the force and restraint used upon them. They responded to such stimuli about as other people would. Conolly still isolated the most excited cases, substituting the padded cell for the straitjacket, but in the course of the next few decades this also was given up. One daring experiment was to take away the husky male attendants and leave even the male patients under the direct supervision of female nurses, the result being an almost complete disappearance of dangerous violence.

Thus this long experiment in the management of insane people gave a clear psychological result. Such stimuli as chains or force or even the obtrusive presence of attendants who are looking for trouble give rise to violent responses. Friendly treatment leads to mild behavior, though it does not restore the patient's sanity nor straighten out his whole adjustment to life.

As to the cure of insanity, or of feeble-mindedness, or of the neuroses, we are still very much in the dark. The feeble-minded individual, in general, is not cured of his mental deficiency. Many efforts have been made to bring the feeble-minded up to normal intelligence by special types of education; but the most that has been accomplished is to equip them with such skill and knowledge as come within the feeble-minded range. Much can be done to improve their lot in life, once their limitations are recognized. The possibilities of treatment have however not been exhausted. Except where mental defect is due to brain injury or disease, it usually occurs in low-grade homes, so that it is quite possible (a) that the very early environment of feeble-minded children is too unstimulating for normal development, or (b) that the nutrition of these children is lacking in some elements that are necessary for normal brain development and activity. The coming century may show us some surprises along one of these lines.

The "insane," as they are called in popular speech—the name has been discarded by psychiatrists who prefer for their own use the term "psychotic" which is free from popular and legal implications—the insane are not born insane but become so later, usually either in adolescence or

else rather late in life. Heredity does seem to be a strong factor in the causation of insanity, and yet it is very doubtful whether any individual is doomed to insanity by his peculiar heredity. What we should say, rather, is that some individuals have by heredity a low power of resistance to the difficulties of life, and consequently go insane more easily than others.

The long, persistent search for the causes of insanity has met with some success, but only partial success. There have been two schools of thought among psychiatrists, two guiding principles in the search for causes. One school, the somatic, starts from the premise that mental disease is really bodily disease, most likely brain disease. The opposed school, the psychic, believes that mental disorders are really maladjustments or failures, more serious but not essentially different from the minor failures and maladjustments that occur in everyone's life. These schools have had their ups and downs, now one and now the other making the greater discoveries and enjoying the greater prestige.

The somatic school can claim success with regard to senile dementia, post-alcoholic insanity, and paresis. In old age the brain shrinks to some extent and loses some of its delicacy of structure; and these changes are especially pronounced in

those old persons who become demented. Post-alcoholic dementia also shows brain degeneration. The most dramatic discovery of this sort relates to another common type of demented insanity known as paresis or general paralysis. It was found that brain degeneration occurred regularly in this disorder, and later it was shown that the degeneration was due to the invasion of the brain substance by the microörganism of syphilis. Antisyphilitic drugs are of value in the early stages of paresis.

The psychic school has had its greatest success with the neuroses of which we have already spoken. These are milder disorders than the psychoses and do not incapacitate the sufferer so completely for participation in social life. The microscope has failed to reveal any brain degeneration in the neuroses, and the present view is that they are "psychogenic," mentally caused or, we may better say, resulting from inadequate solution of life's problems and often from a progressive accumulation of poor solutions which leaves the individual's life distorted and increasingly difficult. Sex complexes and feelings of inferiority are regarded by the psychic school as explaining these maladjustments. Badly "conditioned" fear responses explain some cases. Poorly chosen goals and impossible patterns of life describe many cases.

Though the psychic school is able to make an impressive showing in this field of the neuroses, the field has by no means been mastered and the possibility remains that the somatic viewpoint has to be added before the field is seen in its true light.

There are certain common types of insanity in which neither school can as yet claim much success. One is dementia precox, and another manic-depressive insanity. The manic-depressive person has weeks or months of abnormal excitement, and other long spells of excessive depression, but still is normal for much of the time. The dementia precox patient becomes queer during youth usually; he appears to withdraw himself from the environment and to become shut up within himself. This shut-in, inaccessible condition persists for life, usually, though something can be done for those cases that are caught early. Neither in dementia precox nor in manic-depressive insanity does the brain structure appear to be affected. They remain puzzles to the somatic school, but the psychic school also has very little success in treating these conditions. Conceivably, they are due neither to mental causes nor to brain degeneration. The cause may be chemical. In manic-depressive insanity, the shifting from one condition to another certainly suggests a chemical or

metabolic change, which might have to do with the endocrine glands, the thyroid, adrenals and others. These glands do affect mental activity and emotional tone, but whether they have anything specific to do with manic-depressive insanity or dementia precox is altogether uncertain at present.

Good brain structure and good blood chemistry are undoubtedly necessary for normal mental activity and for mastery and adjustment in life. But they do not guarantee mastery and adjustment. They do not guarantee adequate motivation nor freedom from conflict of motives. We have always to reckon with the individual's environment, and also with his past or rather with the goals, attitudes and habits developed in his past life and carried over into the present.

CHAPTER XII

MISCONDUCT

The criminal, like the insane person, has become the object of scientific study during the past century. A beginning has been made towards the understanding of crime, delinquency and misconduct, as well as towards the understanding of insanity and the neuroses, though undoubtedly more progress can be claimed for psychiatry than for criminology.

A century ago—or a little more—the theory of crime was essentially demonological. The criminal was believed to be instigated by the devil, being however morally responsible because he had wilfully accepted the devil's promptings. Causes were sought in the supernatural realm and not in the limitations of the criminal nor in the social forces acting on him.

The first serious attempt to bring crime into the view of natural science was made from the side of anatomy. Lombroso in Italy about 1876 thought he could detect malformations of the face and skull which indicated that the criminal was a peculiar type of man. He thought of the criminal type as a

sort of reversion to primitive man. The typical criminal, he believed, engaged in crime because he was a born criminal, a primitive and scarcely human creature incapable of adjusting himself to civilized life. Though this theory was hasty and premature, it had the merit of directing scientific attention to the criminal as an individual.

Not till 1913 was a careful check made of Lombroso's claims. In that year, Goring presented the results of a study of 3000 English convicts, among whom he found a notable absence of the "criminal type." The heads and faces of the convicts were like those of other men, varying among themselves as other men varied, so that it was impossible to separate criminals from non-criminals on any such anatomical basis. Goring did find his convicts to be undersized on the average. They averaged 5 feet $5\frac{1}{2}$ inches tall instead of 5 feet 7 inches, the general average for the adult male population of England; but certainly no one would dream of separating off men of 5 feet $5\frac{1}{2}$ inches or less as a born criminal type. Since criminals come disproportionately from poor homes, the low average stature might be the result of under-nutrition in childhood. Or, we may suppose, the undersized individual is more likely to be led into thievery because he has less earning

power as a laborer. Or again, he may strive to compensate for his unimpressive physique by assuming the rôle of a bold, bad man.

After this anatomical phase in the scientific study of the criminal came a phase which we may call psychological as it resulted from the invention of the intelligence tests. When these tests were first given to criminals and juvenile delinquents, they seemed to show that a very large proportion were of distinctly low intelligence. There seemed to be a close connection between delinquency and mental defect. But these first studies were inadequate in the number of cases tested, and also in the tests used; for the early intelligence tests were not extended up the age scale far enough to give a full measure of adolescents and adults. With the improvement of the tests and the use of larger samples it was found that the large majority of criminals and delinquents were not feeble-minded. They do average below the general average, centering around an intelligence quotient of 90 instead of 100; a relatively large number of them are of low intelligence and a relatively small number of superior intelligence. There is therefore some slight connection between low mentality and delinquency, but nothing more. We can easily see why dull children and adults should be led into

crime more easily than bright ones. They have less earning power, less social recognition, and less ability to appreciate the standards of society.

Following close upon the heels of this psychological attempt to account for delinquency was an attempt of the psychiatrists. Admitting that the criminal was not in most cases feeble-minded, they thought it probable that he was mentally unbalanced or emotionally unstable. Examining prison populations they found few individuals, to be sure, whom they would diagnose as actually insane and not many whom they would class as neurotic, but a great many whom they described as "constitutionally inferior" or as of "psychopathic personality," i.e., as inadequate, queer and unstable. Since however it is sure that a great many non-criminals could be described in the same way, we still have no explanation why some individuals become criminal and others not. We can see indeed that an individual of inadequate personality, like one of low intelligence, would be at an economic and social disadvantage and *more easily* led into crime.

The latest effort of a scientific group to trace the causes of crime comes from the sociologists. They have shown that both juvenile delinquency and adult crime flourish in certain neighborhoods and in certain groups of people. It is indeed many

years since attention was called to the "Jukes," a group of related families in a certain hilly district in New York State, who were characterized by shiftlessness, pauperism, drunkenness, sexual irregularities, and crime. Sociologists have stressed the early environment of the children growing up in this precious clan as the causative factor in their peculiar mode of life. Biologists studying the same and similar isolated groups have pointed to defective heredity as a causative factor. It is really impossible to separate the influences of heredity and environment in such a group. More recently, Chicago sociologists have studied city neighborhoods, immigrant groups, and gangs, and, while not able to rule out the factor of heredity, have for their part advanced the thesis that delinquency in certain areas and groups depends mostly on the social background. Delinquency is so common in some neighborhoods and so little frowned upon by the adults, as to be practically the normal and accepted behavior for the boys. Crime, according to this view, is an affair of the social group rather than of the individual.

None of these conceptions of the causation of crime is able to hold its own. You take two boys of the same height or with the same shape of head and face: one steals and the other does not. You take two boys of the same intelligence: one steals

and the other does not. You take two boys of the same personality: one steals and the other does not. You take two boys from the same neighborhood, school, family even: one steals and the other does not. Broken homes often seem to be a factor in the delinquent conduct of the children; but many children from broken homes are far from delinquent. Of all the factors and influences that have been studied, no single one shows anything like perfect correspondence with criminal conduct. Each may be considered as a stimulus to misconduct, a stimulus rather than a force, since the individual who receives the stimulus is capable of responding either by yielding or by resisting. Often a combination of such stimuli will get a response that no single stimulus would have awakened. So we have, as the result of half a century of work, a scientific result, even if not a very clear and simple one: the factors in criminal conduct are many.

TREATMENT OF THE CRIMINAL

Society is faced not only with the problem of understanding the criminal but also with that of deciding what to do with him. Punish him in the spirit of revenge? Put him away where he can do no further harm? Reform him and make him a good member of society? Opinion and practice

have swung more and more away from the first alternative and towards the third. Prisons have come to be called "houses of correction," "reformatories" or "industrial schools." Society has been making experiments in reformation, but has not kept good tab on the results, so that none of the experiments is clean-cut and decisive.

At one time much was hoped from solitary confinement. Left to his own regrets, the prisoner should see the error of his ways, repent and reform, just as a disobedient child, rebellious and defiant, but sent to his room to think it over, may have a good cry and come out in a softened mood, wishing to be forgiven and accepted back into the family. This treatment was not successful with the criminal, either because he was more hardened than the child or perhaps because too much time was allowed for repentance. Prolonged isolation leads to antisocial feelings rather than to repentance.

But if solitary confinement has not worked well, neither has confinement in contact with other delinquents. Hostility to the law and to society grows in the soil of the typical reform school, which now appears to be an effective school of crime. Something more constructive than simple confinement, or than confinement with discipline and schooling, is needed to insure reform.

Of recent years the effort is more and more to

keep the offender out of prison, by releasing him on parole, or, more hopefully, by placing him on probation before the prison sentence is enforced. The probationer is left in society though under supervision, and is dependent on his own good behavior for his continued freedom. Probation is the most hopeful experiment in sight, but we need to be scientific about it by making sure that we know the probationer, that we know what we are doing to him, and that we know how he responds to our treatment.

As prevention is better than cure, criminologists are asking whether the young people cannot somehow be prevented from entering or even approaching a criminal career. So far as crime is the work of defective or peculiar individuals, we can seek out these individuals early in life and keep watch over them. So far as it is the work of groups or neighborhoods, we can improve those neighborhoods as places for young people. So far as crime is bound up with our imperfect social and economic system, a symptom of disease in the body politic, we have a tremendous problem on our hands which will probably take another century of progress to work out.

CHAPTER XIII

TEAMWORK

When the individual's actions are stimulated by other people, directed towards other people, or done together with them, we speak of social behavior. Often an individual who is physically all alone is virtually engaged in social activity, since he may be preparing a lesson to recite before a class, or planning a party, or laboring for the support of his wife and children. A large share of all human activity is social in some degree.

Why, we may ask, do men engage so largely in group activity? Why do we live in society? One answer has been that we do it for mutual help and practical advantage. By producing what others wish to consume we put ourselves in a position to trade our products for theirs and so have more goods for our own private consumption. But this answer does not get to the root of the matter, for we see people getting together to *enjoy themselves.* Social activity is not only an efficient form of labor, but is preferred for its own sake. If every one took his acquired goods, as the dog takes his

bone, off into the corner to consume in private, the "mutual aid" theory of society would stand on firmer ground. But we spend much of our money for goods to consume in company. Instead of assembling for work and going each to his corner for play, we are apt to do just the opposite.

A second answer is that we enjoy society because it gives each person a chance to display himself and to outclass his fellows in some way or dominate over them. This theory explains very well those forms of social behavior which consist in the competition of one person with another. But the greatest amount of pure competition would be obtained by splitting a party up into twos and letting each pair play a game by itself. The games in which one pair of partners plays against another, or one team against another team, are usually the preferred games, and reveal the presence of something besides the spirit of pure competition.

This something more is the liking for group activity and teamwork, of which a little was said in our discussion of motives. It is fun to play against a competitor, but it is also fun to play with a partner, and it is especially satisfactory to play as a member of a team. It is exhilarating to participate in good teamwork, where each individual's action fits into the action of the team as a whole.

Each member is proud of what "we" have done and can do. Teamwork gives the individual a sense of power and the joy of participating in doings that are big, complex and well organized. Besides all this, group activity gives a chance for the personalities of the individuals to show themselves in interesting ways. A person in a glass case, busy with his own affairs, might be likable, but his likable qualities show up much better if we let him work or play with other people. So group activity is not merely a chore; it is man's preferred type of enjoyment.

There is then plenty of motivation for social behavior. But, granted that human beings like to integrate their individual acts into group action, the question remains how they manage to do this. If a number of little children, eighteen months old, are brought together in a nursery school, they pay little attention to one another. Each child plays up to the adults present, more than to the other children. Within a few months they make crude approaches to each other, such as touching, pulling and pushing, but still they are not playing together in any real sense. Then comes a stage in which they like to do the same thing at the same time. If they have blocks, each child will be making his own construction, though looking from time to time at his neighbor's and calling the neighbor's

attention to his own. If they have a slide, they take turns sliding. They evidently are stimulating each other and competing to some extent with each other, but still they are not integrating their actions into genuine group play. Later on, in playing with blocks, one will build a train and another a station, and the train will stop at the station. Later still, several will combine to build a large structure. Thus there is a gradual progress from separate activities, through parallel activities and interrelated activities, up to organized group activity.

The members of a group act in unity when they are acting upon the same object and aiming at the same result. If they are rolling a heavy stone, the stone itself is the integrator, provided of course all the men are aiming to move it to the same place. If they are playing football, the ball is the real captain, since it is the movement of the ball that directs the activities of the several players. In activities as complex as this, to be sure, it is necessary to have a captain among the players as well, in order to avoid cross purposes in matters of detail. Where there is no designated captain or boss, some member of the group is likely to rise to the occasion in an emergency, take the lead and help greatly to insure teamwork. But even without any leader a group achieves unity of action

when the objective situation dealt with is clear and the goal of action definite. A while back, in the chapter on "adjustment," we saw that the individual was tuned to objective facts. On the sensory side he registers the facts of the environment and on the motor side he manages objects of the environment. This objectivity of the individual makes unified group action possible. If all the members of the group see the same facts and aim at the same goal, they can act in harmony with each other.

But now let us suppose that the situation is not clear and the essential facts not visible, then how can the group integrate its activity? The group has a problem to be solved, and the question is whether group thinking is possible, or whether each individual will have to think the problem out for himself. If you set four people a problem to be thought out together, you find that your group needs to be carefully selected in order to do any effective thinking. One person may insist on taking the problem off into the corner and thinking by himself. Another, while remaining in the group, is shy and offers no suggestions. Still another is eager to take the lead but does little thinking. But a group composed of just the right individuals does remarkably effective work on a problem. One person makes a suggestion which is

immediately seen by another to be useless. A third comes in with a fruitful lead which is followed up by a fourth. Where an individual thinking alone becomes fascinated with certain leads and remains blind to other leads, the group as a whole is more openminded. A good group is more fertile than the individual, both in suggestions and in objections.

There are two very different ways of reaching a group judgment on a matter of fact. One is the usual jury procedure of letting the members argue the question among themselves in the effort to reach agreement. In such discussions a dominating or persuasive member often has undue influence on the decision. The other way is to forbid discussion altogether between those who are to decide the question, and to have each individual give his vote separately, and then count or average these votes. Sometimes a very accurate judgment is obtained in this way. For instance each of a class of students recorded his independent estimate of the room temperature, which was actually 72°. The estimates varied from 60 to 89, but the average of them all was 72.4°. One person's error corrected another's. But whether on the whole this method of independent judgments is better than the jury method we do not yet know.

One important question related to group think-

ing is whether science and invention are the product of individuals or of the social group. When we speak of a scientist as having made a certain discovery, or of an inventor as having produced a certain invention, no doubt we are honoring individuals who deserve honor for their ability and devotion to their work. But no scientist or inventor ever started from zero in working up to his brilliant achievement. He started from the work of his predecessors. It is surprising how often the same discovery or invention has been made independently and almost simultaneously by two or more men. Here are a few examples:

Oxygen was discovered in 1774 by Scheele and by Priestley.

Photography was invented in 1839 by Talbot and by Daguerre.

The telephone was invented in 1876 by Bell and by Gray.

The phonograph was invented in 1877 by Edison and by Cros.

The microphone was invented in 1877–78 by Edison, by Berliner, and by Hughes.

Similar coincidences are always occurring and the reason is perfectly clear. When several men are working on the same problem independently of one another but with the same background, it is to be expected that more than one will hit upon the

same clue and reach the same solution. The social group has provided the background and the incentives and is entitled to part of the credit for the discovery, the invention, or the work of art that has been produced by the creative individual. It is man in society, rather than man as an individual, that does these great things.

It is only half true to speak of the social group as made up of individuals. Certainly it is not *made* by those individuals. Each new individual is born into a group which is already a going concern, with its language and customs, with its organization and institutions, with its houses, roads, tools and art objects, and in a word its culture, already present. The individual may modify the group and its culture to some extent, but he does not make them so much as they make him. Society is prior to the individual, and group activity is something already going on in which he finds his little part to play. Even when he is quite individualistic in spirit, you will find on analysis that his interests and goals are all shot through with social implications.

Good teamwork is the highest form of human activity. The great artist or scientist, though he be a lone worker, actually keeps in touch more or less directly with the work of his fellows. His work ties in with theirs. Group activity, inte-

grating the acts of individuals towards a common goal, is not only the most productive type of human endeavor, but the most satisfying to the individual. To make the world a better place for the individual, then, we have to improve the organization of group activity. We have to take account of the motives and desires that are common to men, and also of the differing abilities of men, and so organize our social activities, in work and play, as to provide for each individual an outlet for his energies. The best hope for the future of mankind lies in man's love of teamwork. But before an ideal society based on teamwork can be achieved, there must be much further discovery and invention within the field cultivated by the sciences of man. More power to them!

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